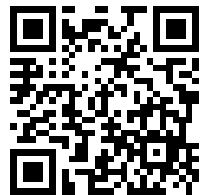

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TO

THE FOURTH EDITION.

The West Indian Pilot, Vol. II., contains Sailing Directions for all the outlying islands in the Caribbean sea, from Barbados to Cuba, with Florida strait, Bahama and Bermuda islands. Also Remarks on Revolving storms and on Passages.

The Directions are compiled chiefly from the following sources:—

The surveys and directions of Captains R. Owen, E. Barnett, Commander T. Smith, Lieutenants G. B. Lawrance, T. F. Pullen, A. Carpenter, W. S. White, Staff Commanders J. Parsons and G. Stanley, R.N.; and the Remark Books of officers of Her Majesty's ships employed on the West India station to 1886; also Sir R. Schomburgk's papers relative to the Virgin islands and Puerto Rico, and history of Barbados, 1848; Nautical Magazine; Mercantile Magazine; Blunt's American Coast Pilot, 20th edition, 1864; Description Nautique des Côtes de la Martinique, par M. Monnier; Manuel de la Navigation dans la Mer des Antilles, par M. C. P. de Kerhallet, 1875; Derrotero de las islas Antillas, 1863; Madrid 1885. Anuario de la direccion de Hidrografia, Supplement a L'Instruction No. 537, or Paris N. H. 13-1883.

It is necessary to observe that the description of the eastern coast of St. Lucia is derived from sources chiefly topographical. With this exception, and the islands of Martinique and Guadaloupe, the surveys of the above-named officers in the eastern part of the Caribbean sea embrace all the islands eastward of Culebra, and as far southward as Grenada and Barbados, together with Jamaica.

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The navigator is also warned that information on the coasts of Puerto Rico is still scanty, and that too much dependence must not be placed on it; also that the directions for the eastern parts of Haïti or San Domingo, both on the north and south shores, are incomplete.

The south coasts of Cuba between cape Cruz and cape Corrientes, and the north coasts between Matanzas and Paredon Grande cay, are likewise imperfectly known, and greater publicity is given to these requirements with the hope that officers, both in the Royal and Mercantile Navies, will transmit to the Secretary of the Admiralty a notice of any errors or omissions they may discover in this work, or any fresh information they may obtain, with a view to its improvement for the general benefit of the mariner.

The manuscript of this work, by Captain E. Barnett, R.N., was revised by Staff Commander J. W. King, R.N., and published in 1859. The second edition was prepared by Staff Commander J. Penn, R.N., in 1865. The third by Staff Commanders H. R. Harris and G. A. Browning, R.N., of the Hydrographic Department, Admiralty, in 1876. The present edition has been prepared by Captain J. G. Dathan, R.N.

By the publication of this work, all Hydrographic Notices relating to the former edition, as also all Notices to Mariners, inclusive of No. 46 of 1887, are cancelled.

W. J. L. W.

Hydrographic Office, Admiralty, London,
March 1887.

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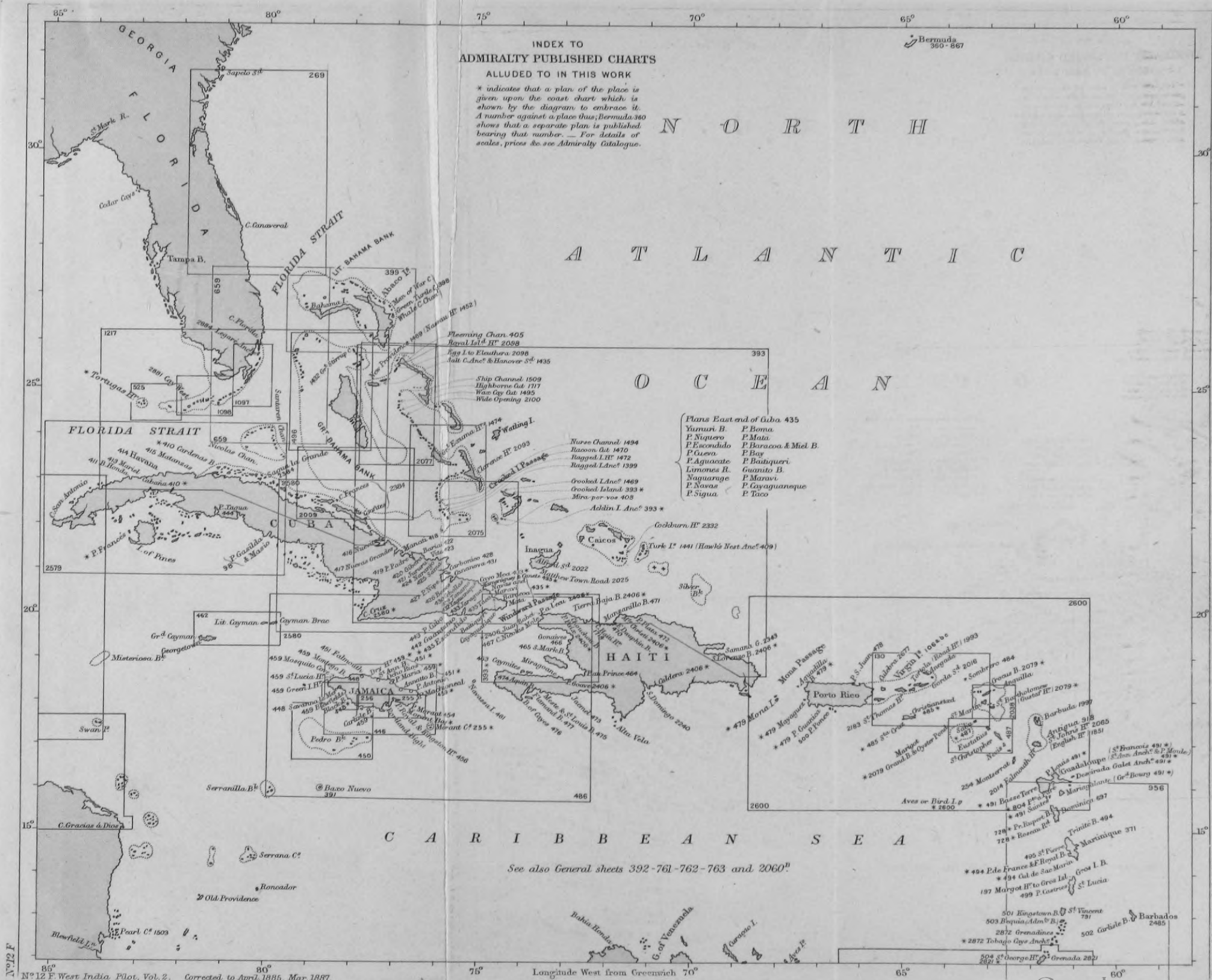
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**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC,
EXCEPT WHERE MARKED AS TRUE.**

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.**

**A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO
100 FATHOMS.**

**THE SOUNDINGS ARE REDUCED TO LOW WATER
OF ORDINARY SPRING TIDES.**



For later information respecting the Lights which are described in this Work, seamen should consult the Admiralty List of Lights on the Eastern shores of North America, &c., including Bermuda and Islands of the West Indies. This List is published early in the current year, corrected to the preceding 31st December.

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THE WEST INDIA PILOT.

VOLUME II.

INTRODUCTORY CHAPTER.

GENERAL DESCRIPTION — PRODUCTS — NATIONALITIES —
CLIMATE, WINDS AND WEATHER, HURRICANES, CURRENTS
—PASSAGES.

GENERAL.—That portion of the West Indies embraced in this volume, consists of an immense number of islands and islets, some of them being mere rocks. They extend from 12° to 27° N. latitude, and from 59° to 85° W. longitude, they are sometimes called the Antilles (from *Ante insulæ Americæ*) and are divided into the greater and lesser Antilles, the former comprising Haiti (San Domingo or Hispaniola), Cuba, Jamaica, and Porto Rico, and the latter the eastern islands, with those along the north coast of South America; again they are sometimes divided into the windward and leeward islands, terms which are purely conventional, differing with different nations according to the position of their respective possessions. In English maps the Caribbean (or eastern) chain of islands has generally been divided into two classes, the windward and leeward, but this distinction does not seem consistent, as with reference to the trade wind, the whole group constitutes the windward islands, and they are now generally considered as such, while those lying along the coast of Columbia (or the north coast of South America) are called the leeward islands. In short the Antilles is but another name for the West India islands generally, exclusive of the Bahamas.

TYPE OF ISLANDS.—The Antilles differ very widely in many respects, the greater Antilles appear to be of primative formation, with lofty granite mountains; but most of the lesser Antilles exhibit manifest proof of their volcanic origin; craters are still visible in some, and active volcanos, so called by the common name of *Soufrière*, exist in St. Vincent,

St. Lucia and Guadaloupe. From the Soufrière of St. Vincent a great eruption took place in 1812, these islands are all subject to shocks of earthquake, and there is scarcely one in which some memorial of disaster from this cause does not exist. The memorable earthquake which destroyed Lisbon in 1775, was felt in these islands, the shock occurring four minutes later than at Lisbon.

ASPECT.—The general aspect of the Archipelago is mountainous, the summits of the elevated lands are sometimes pointed and naked, others are rounded and wooded, the volcanic islands have isolated conical and pyramidal mountains, whose tops are often above the clouds, their surface is intersected with deep ravines and bristled with rocks.

BAHAMAS.—The Bahama islands differ entirely from the other West India islands; they are comprised of numerous irregularly shaped white sandstone islets and rocks, thinly wooded, the loftiest being not more than 400 feet high, most of them being under 100 feet, and many only a few feet above the sea, a full description of this group will be found at page 470.

FLORIDA CAYS AND REEFS.—These belong to the United States of America, they are all of a similar character to the Bahama group.

PRODUCTIONS.—The principal productions of all the West India islands are sugar, molasses, rum, coffee, tobacco, indigo, lignum vitæ, pimento, logwood, mahogany, and beeswax, also fruit of all tropical description, particularly oranges from Porto Rico, and pine apples from the Bahamas, whence also great quantities of sponges and salt are exported.

INHABITANTS.—The inhabitants are chiefly negroes, who form four-fifths of the entire population, the other fifth being made up of creoles and settlers, there are none of the aborigines left, the last of the Caribs having it is said been destroyed at Grenada.

NATIONALITIES.—The British possessions in the West Indies comprised in this volume are Barbados, Grenada, the Grenadines, St. Vincent, St. Lucia, Dominica, Antigua, Barbuda, Montserrat, Nevis, St. Kitts (or St. Christopher), Anguila, Sombrero, Anegada, Virgin Gorda, Tortola, Jamaica, the Caymans, and all the Bahama group. The French are Guadaloupe, (with Maria Galante and other outlying islands), Martinique, St. Bartholomew, and the north part of St. Martin. The Spanish are Cuba, Puerto Rico with Culebra and Bieques (or crab island). Holland possesses Saba, St. Eustatia (or Statia) and the south part of St. Martin. Denmark has St. Thomas, St. John and St. Croix (or Santa Crux). Haiti or San Domingo is independent, the eastern part being the republic of San Domingo and the western part the republic of Haiti.

CLIMATE.—The climate of the West Indies generally is enervating to the European; but compared to other parts of the tropics, the islands cannot generally be called unhealthy, though there are doubtless many localities, more especially in the larger islands, which bear, probably with cause, an evil report in this respect. Yellow fever rages from time to time as an epidemic, and is said never to be totally absent from some towns of Cuba. In the winter weather the temperature of the Windward islands is never unpleasantly high, and at this period of the year Nassau has become a favourite resort for visitors from the United States suffering from delicate lungs.

SEASONS.—The year as in most tropical climates may be divided into two seasons, the wet and the dry; yet sufficient variations exists to mark the four seasons of more temperate regions, the spring may be said to commence in April; during May gentle showers fall generally every day about noon and break up with thunder storms; from May to October the tropical summer reigns in full glory, and before the sea breeze sets in, the heat is unbearable; with October commence the autumnal rains, when the water literally pours down in torrents, this continues till the middle of December, between which time and the beginning of April (which is the winter) serene and pleasant weather prevails. The wet and dry seasons follow the movements of the sun, the wet is when the sun is in the tropic of Cancer, when heavy rain and electrical storms are prevalent. At this season the wind is generally south of east; when the sun removes to the tropic of Capricorn, the dry season commences and the trade wind is steady at N.E. In the change of the seasons there is a remarkable difference, for in April and May no change is experienced in the atmosphere and the weather is generally beautifully fine, but in August, September, and October, there are usually calm and very light winds, and occasionally hurricanes.

WINDS AND WEATHER.—Among the islands the course of the easterly or trade wind is uninterrupted, though subject to some modifications in direction and force; at a short distance from the land, the sea breeze dies away at night and is replaced by a land wind, this variation occurs every day unless a strong wind from either northward or southward prevail, the first of these being experienced from October to May, and the latter from July to September. At Jamaica the air is in most parts hot and unfavourable to European constitutions, but the cool sea breeze, which sets in every morning renders the air more tolerable; lightning occurs almost every night, and, when accompanied by thunder, the latter is very heavy. On the north side of the island the sea breeze from south-east comes on in the morning and gradually increases till noon, and in general dies away by five o'clock; about eight in the evening the land wind begins, it increases

up to midnight, and ceases about four in the morning. August, September, and October, are the hurricane months, in which there are frequent strong gales of wind and much rain; in December, January, and February, when the north winds predominate, their force checks the sea breeze. In July and August the sea breeze about the islands generally blow impetuously and in frequent squalls; in October northerly winds frequently extend over all the Bahamas, Cuba, and sometimes on the north side of Jamaica. The Bahamas are all within the influence of the trade wind, but their lowness exempt them from the regular land winds; in summer the trade wind is generally to the southward of east, and at this season squalls rush down with great violence; in the winter months from November till the middle of March the trade wind is frequently interrupted by north-west and north winds.

Off the south coast of Cuba is a local wind called the Bayamos, violent gusts more frequently felt of the bight of Bayamo, fortunately they are of short duration, they are attended by sheet and forked lightning, the sea is whitened with foam, and the rain falls in torrents; the Bayamo squall, however, although the most to be dreaded of any in the Caribbean sea, is grand and sublime.

From the middle of December to April is the winter, when serene, dry, and pleasant weather prevails; from May to October the atmosphere is very damp, and the heat almost unbearable before the sea breeze sets in.

HURRICANES.—The whole locality included in this volume is within the region where hurricanes prevail. It will be seen by the accompanying table that they are more prevalent in the months of July, August, September, and October, which are called the hurricane months, still they have been known to occur in every month of the year, as will be seen by the following table.

TABLE of RECORDED HURRICANES in the WEST INDIES.

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
West Indies 300 years.	5	7	11	6	5	10	42	96	80	69	17	7	355

Though it is not possible to state positively the relative prevalence of these storms in different parts of the West Indies, for lack of statistics on the subject, it may be generally said that in the southern part of the area dealt with in this volume they are more rare than in other parts. Thus, Trinidad (which is beyond the limit of this work) has never felt a hurricane; Grenada has experienced none for 100 years; as we work

north we find them more frequent, until the line of the greater Antilles is reached, and here is perhaps the maximum prevalence.

GENERAL CHARACTERISTICS OF REVOLVING STORMS, WITH DIRECTIONS
FOR AVOIDING THEM.*

These storms are seldom experienced within 5° or 6° of the Equator, and have not been traced into very high latitude. They are most prevalent during the months following the summer solstice, or in other words, from July to October. They are commonly known as hurricanes in the West Indies.

Hurricanes have, in addition to a motion round a centre, an onward movement. The wind blows in a more or less circular course round the centre, and at the same time the storm field advances sometimes with great velocity, and sometimes appearing to pause or scarcely to advance more than a few miles in an hour.

The space over which these storms have been known to expand themselves varies from 20 or 30 miles to some hundreds of miles in diameter; the wind blows with an ever varying force, now lulling into little more than a strong breeze, and as the centre is approached often rising into a blast of irresistible fury.

It is an invariable characteristic of their revolution, that the gyration of the storm field takes place in one direction; in the northern hemisphere in the opposite direction to the hands of a watch, and in the southern hemisphere with the hands of a watch. The knowledge of this law is the more important, as it not only supplies the seaman with direct means of distinguishing these storms from gales in which the direction of the wind varies little if at all, but also reveals to him the position of the centre or vortex with respect to the place of his vessel, and therefore points out the way to avoid it, and so to escape from the region of greatest danger where the fury of the wind is most extreme, the changes of its direction most sudden, and the sea most to be dreaded.

In the Atlantic these storms commence to the eastward; for some days they travel along a path not exactly West, but inclining a point or two towards the pole of that hemisphere which they are crossing; and as they advance, they seem more inclined to curve away from the equator. When they reach the 25th degree of latitude, they generally curve still more, until they move to the N.E., almost always wheeling round to the Northward in the Mexican Gulf, or in its vicinity, and follow the sea-board of North America.

The rate of movement of these storms, though variable, may be averaged at 300 miles a day in the West Indies.

* For further particulars, see "A Barometer Manual for the use of Seamen," 1884.

The indications of the approach of a revolving storm are the usual ugly and threatening appearance of the weather which forbodes most storms, and the increasing number and severity of the gusts with the rising of the wind. These signs are in some cases preceded by a long heavy swell and confused sea, which comes from the direction in which the storm is approaching, and travels more rapidly than the storm centre.

The best and surest of all warnings, however, will be found in the barometer. In every case there is great barometric disturbance, the barometer at the centres of some of the storms standing fully two inches lower than outside the storm field. Accordingly if the barometer falls rapidly; or even if the regularity of its diurnal variation be interrupted, danger may be apprehended.

No positive rule can be given as to the amount of depression to be expected. There are numerous records of the barometer falling below 28 inches in the West Indies, and the suddenness of the fall may be realized by an authenticated record of a fall of 1·7 inches in one hour and ten minutes. The average barometric gradient near the vortex of the most violent of these storms is said to be rather more than 1 inch in 50 nautical miles.

As the centre or vortex of the storm is approached, unless the vessel be on the line of its advance, the more rapid become the changes of wind, till at length, instead of veering gradually, as is the case on first entering the storm-field, the wind flies round at once to the opposite point, the sea meanwhile breaking in mountainous and confused heaps. There are many instances on record of the wind suddenly falling in the vortex, and the clouds dispersing for a short interval, though soon the wind blows again with renewed fury. Few vessels have ever passed through the vortex without losing either masts or rudder, or meeting with some worse disaster, and therefore, at whatever cost, the central part of the storm-field should be avoided.

The first care of the commander of a vessel caught in a hurricane will be to find how the centre bears from him. In the northern hemisphere let him, facing the wind, take eight points to the right of the direction of the wind, and that will be the approximate bearing of the centre. Thus with the wind from N.E., the centre will bear S.E.

In the present discussion, the motion of the wind in a cyclone will, for the sake of simplicity, be treated as approximately circular. But this is not strictly the case, and there is evidence to show that frequently in some parts of the storm-field there is more or less indraft. At a considerable distance from the centre, and before the barometer shall have fallen much below its normal value, the centre may bear 10 or 12 points from the direction of the wind (reckoned to the right or left according to the hemi-

sphere); but after *the barometer has fallen five or six tenths of an inch* it is probable that the wind then blowing forms part of the central storm-circle, and the bearing of the centre may be taken as eight points from the direction of the wind.

It has been said that the seaman's first care will be to know how the centre bears. His next care will be to know on which side of the storm's path his vessel is situated, and the direction in which the storm is moving. In the northern hemisphere if she be situated on the right-hand side or semicircle of a storm travelling to the westward—looking in the direction to which the storm is travelling—the wind will veer N.E., E., S.E., S., &c., or with the hands of a watch; on the left-hand side the wind will back N., N.W., W., &c., or against the hands of a watch.

In speaking of the shift of wind such a shift is meant as would be observed on a vessel hove-to; for if the vessel be moving faster than the storm, and in the same direction, the shift may be in the opposite direction to what has been stated.

If while the vessel is hove-to the wind be found to remain in the same direction, increase in violence, and be accompanied by a falling barometer, it is probable she lies in the path of the advancing storm—the most critical of all positions.

The wind in front of the storm-field blows towards the path on one side, and away from it on the other. Consequently, if we suppose the cyclone to be bisected by a line representing its path, a little consideration will show that in the semicircle on one side of the path, a ship running before the wind may probably be brought to cross the path of the storm in front of its centre, and therefore under circumstances of the greatest danger; in the semicircle on the other side of the path a ship running before the wind will probably cross the path in rear of the centre. The former of these semicircles has been called the “dangerous” semicircle.

When looking in the direction in which the storm is travelling the dangerous semicircle is always on the right hand in the northern hemisphere; also, in both hemispheres, in the right-hand semicircle the wind, to a ship hove-to, always veers,* in the left-hand semicircle it always backs. The semicircle with veering winds is the dangerous semicircle in the northern hemisphere.

The recurvature of the path always takes place towards the side on which the dangerous semicircle is situated, *i.e.*, to the right in the northern

* The terms “veering” and “backing” applied to the wind, may be explained with reference to the movements of watch hands, the former signifies shifting in the same direction as the hands, and the latter in the opposite direction, and they have the same meaning in the two hemispheres.

hemisphere. Hence so long as the vortex is travelling to the West, the winds in front of the advancing centre are North-easterly ; as the vortex turns to the North, the winds in front are Easterly ; and after it has turned to the Eastward the winds in front are South-easterly.

We derive, then, the following rules to find *the most dangerous wind*, supposing always that the track of the storm recurves in about lat. 30° N. Between the Equator and 30° N. lat., N.E., about 30° N. lat. E., northward of 30° N. lat. S.E.

These winds are most dangerous, because in each case if the wind continues steady from that point and the barometer continues to fall rapidly the ship must be on the path of the storm and directly in front of it, so that she is in the position of greatest peril.

It is difficult to estimate the distance of the centre of the vortex from a vessel. This partly arises from the uncertainty as to the relation between the bearing of the centre and the direction of the wind, and greatly from their being no means of knowing whether the storm be of large or small dimensions. If the barometer falls slowly, and the weather only gradually gets worse, it is reasonable to suppose that the centre is distant ; and conversely with a rapidly falling barometer and increasing bad weather the centre may be supposed to be approaching dangerously near.

Practical rules.—When in the region, and in the season of revolving storms, be on the watch for the premonitory signs. *Constantly and carefully observe and record the barometer.*

When there are indications of a cyclone being near, heave-to, and carefully observe and record the changes of the barometer and wind, so as to find the bearing of the centre, and ascertain by the shifting of the wind in which semicircle the vessel is situated. Much will often depend upon heaving-to in time.

When, after careful observation, there is reason to believe that the centre of a cyclone is approaching, the following rules should be followed in determining whether to remain hove-to or not, and the tack on which to remain hove-to :—

Northern hemisphere.—If in the right hand semicircle, heave-to on the starboard tack. If in the left-hand semicircle, run, keeping the wind if possible, on the starboard quarter, and when the barometer rises, if necessary to keep the ship from going too far from the proper course, heave-to on the port tack.

When the ship lies in the direct line of advance of the storm—which position is, as previously observed, the most dangerous of all—run. And

in all cases act so as to increase as soon as possible the distance from the centre ; bearing in mind that the whole storm field is advancing.

Heaving-to.—If the ship be in the right-hand semicircle, heave-to on the starboard tack. In the left-hand semicircle, heave-to on the port tack ; these being the tacks on which the ship will “come up” as the wind shifts.

In receding from the centre of a cyclone, the barometer will rise, and the wind and sea subside.

It should be remarked that in some cases vessels may, if the storm be travelling slowly, sail from the dangerous semicircle across the front of the storm, and thus out of its influence. But as the rate at which the storm is travelling is quite uncertain, this is a hazardous proceeding, and the seaman should hesitate and carefully consider all the circumstances of the case, particularly observing the rate at which the barometer is falling, before he attempts to cross.

REMARKS on board H.M. Surveying Schooner “LARK,” at anchor off the WEST COAST of ANDROS, BAHAMA ISLANDS, by LIEUTENANT THOMAS SMITH, commanding.

Wednesday, Sept. 5th, 1838.—At 1 p.m., heavy showers of rain drew the wind to the northward, which continued to freshen, with a falling barometer, until the moon rose at 7 p.m. It was full yesterday morning at six, and now had what is termed a sickly appearance. This we considered to be an indication of bad weather, and therefore ran to the eastward until 10h. 30m. p.m., when we anchored in 14 feet, with Wide Opening N. $\frac{1}{4}$ W. 15 miles. At this time the sky had cleared, the wind moderated to force No. 5, and the barometer rose to 30·05 ; but soon after midnight the wind freshened at N.E., and gradually increased until 5 a.m. to force No. 7.

Date.	Hours.	Barom.	Wind.	Force.	Weather.
1838.					
Thursday, Sept. 6	A.M.	In.			
	6	29·76	N. by E.	7	q.p.
	8	29·68		7	
	10	29·70	North	8	r.p.q.
	noon	29·60		10	o.g.r.
	P.M.				
	2	29·40	N. by E.	11	
	4	29·20		12	o.r.q.
	5	29·40		12	
	6	28·68		12	
	7	28·40	E.N.E.	12	o.r.l.
	8	28·20	S.S.E.	11	
	10	28·40		11	
	Mid.	28·68	S.E. by S.	11	

Date.	Hours.	Barom.	Wind.	Force.	Weather.
Friday, Sept. 7 - -	A.M.	In.			
	2	29·00	S.E. by S.	10	o.r.q.l.
	4	29·40		10	
	6	29·60		9	
	8	29·64		9	
	10	29·66	S.E.	8	
	noon	29·70		8	
	P.M.				
	2	29·72		8	
	4	29·70		9	
	6	29·66		9	
	8	29·64		10	
	10	29·62		10	
	Mid.	29·64		10	
Saturday, Sept. 8 -	A.M.				
	2	29·66	S.S.E.	10	o.r.q.
	4	29·64		10	
	6	29·64	S. by E.	9	
	8	29·66	South	8	
	10	29·70	S. by W.	8	
	noon	29·68	S.S.W.	8	
	P.M.				
	2	29·66	S.W.	8	
	4	29·70	W.S.W.	8	o.p.q.
	6	29·72	West	7	
		29·74	W.S.W.	7	o.p.
		29·76		7	
	Mid.	29·78		6	

"At daylight on Thursday morning, a marked fall in the barometer, with a considerable increase of wind, having sufficiently confirmed our suspicions, the topmasts and yards were got down, the boats on deck turned bottom up, and everything done to make the vessel snug.

"The gale rapidly increased till 2 p.m., when certainly no canvas could have withstood its violence, and continued for six hours to rage with fearful fury, accompanied with torrents of rain, and a constant dazzling glare of sheet lightning; and I may here remark that during my long service in the West Indies, I have observed that the true hurricane is never attended by forked lightning or by thunder.

"The *Lark* was the only vessel on the Great Bank that rode out this fearful storm in safety, which may be ascribed not more to her sheltered position, than to her showing nothing above board but the lower masts, while six other vessels, which had kept their yards aloft, were totally lost.

"Owing to a sudden recess of the water, we struck heavily from 6 to 8 on Thursday evening, but were again quite afloat with the south-east part

of the storm. The schooner *Favourite*, 60 miles to the northward of us, was left completely dry.

“It is remarkable that at Ragged island nothing whatever was felt of this hurricane ; that island, New Providence, and Eleuthera, escaped with only a strong gale. Its fury appears to have principally fallen upon the south end of Cat island, Rum Cay, Exuma, Long island, Crooked island, and probably on some of the other islands to the eastward, from which no accounts have yet been received. Turks island escaped. It was not felt at Jamaica, nor along the north side of Cuba from cape Maysi westward to Nuevitas.”

The above extract from the commander of the *Lark's* log, Lieutenant W. Smith, is inserted here, as it shows that though the wind was really revolving round its vortex against the hands of a watch, yet that, from its rapid onward movement, it appeared, to those on board of her, as if wheeling in the opposite direction ; and the reader will further perceive that as that vessel remained stationary, the true position of the vortex may be traced during the whole progress of the storm.

Thus, in the morning of the 6th, the wind was N. by E., and therefore the vortex bore E. by S. ; in the evening the wind being E.N.E., it bore S.S.E. ; and the next day, the wind coming round to S.E., showed the storm to be in the S.W. quarter, where it continued thirty hours.

Now, by referring to a chart of West Indies, it will be very obvious that during those thirty hours the storm was either struggling for admission into the gulf of Mexico, or, having entered and swept round it, was deflected by its western shores, and returned across the peninsula of Florida into the Florida channel, where it manifestly was at noon of the 8th, as appears from its bearing of W.N.W., the wind being S.S.W. It then travelled up that channel till 8 p.m., when the wind being from W.N.W. proved that the vortex at that time bore N.N.E., while its rapid decrease of strength also showed that it was moving off into the Atlantic.

In the same hurricane H.M.S. *Thunder* had anchored some miles farther to the westward, and Captain Barnet's account of the impression it made on him will, no doubt, interest the reader.

“At 7 p.m. on Thursday, the 6th September, we were obliged to drop a second anchor, and at 9 the sheet anchor, and to veer away to the clinches of all three cables. At 10 p.m. the sheet cable parted ; the whale boat was torn from the quarter, the jolly-boat from the stern, and the tender, moored astern by a hawser, soon after disappeared, the ship having passed over her. At midnight the wind somewhat abated in violence, and the ship again brought up.

*“Friday, 7th Sept.—*It had till then been perfectly impossible to work aloft, but in this lull the lower yards and topmasts were got down. As the day advanced, the wind settled at S.E., and the barometer rose two tenths, but at 3 p.m. it had sunk again with frightful rapidity to 28.00. At this period the hurricane appeared to be at its height; the ship was again driving on her broadside, with her head to the southward—the waste and quarter-deck nettings were washed away—the quarter gallery and several main-deck ports stove in—the water on the maindeck nearly up to the combings—the rain, lightning, and thunder intense, and the gusts of wind deafening and impetuous beyond description, yet steady from the same point. The ship now lying over on the starboard broadside was completely at the mercy of the element—the head of the mainmast went, carrying with it the main topmast (although struck),—the remaining quarter boat was washed away from the rigging to which it had been lashed, and in this state the vessel was driving before the wind and sea until about 9 a.m. when another lull commenced, the ship, by the colour of the water, being then in soundings on the Florida bank.

“The wind now fell rapidly, but as the barometer still fluctuated between 28.00 and 28.10, it was evident that the gale was not yet tired, and accordingly at 10.30 A.M. it again rushed upon us from the south with, if possible, increased fury. She was soon thrown upon her port broadside, with her head east exposed to a heavy cross sea which much endangered the rudder, but the fortunate lull had enabled us to use precautions for its safety, which proved successful; though all our efforts to get rid of the wreck of the main topmast were unavailing, and it hung on the weather main rigging, threatening at every roll to carry all before it. At about 3.30 p.m. another lull occurred, and the wind having come to the opposite point to which the gale commenced it was anxiously expected that we were now driven beyond the vortex, and that consequently, the weather would rapidly clear; contrary, however, to our hopes, and to the usually transient course of these awful visitations, in somewhat less than an hour, the barometer again sunk, and still lower, even to 27.90, the wind backed quickly round from S.S.E. to S.E., and at 5 p.m. it again blew from that quarter with indescribable violence.

“Fortunately, soon after the lull, the ship had been thrown with her port side to the wind, which enabled us to get rid of the wreck of the main topmast, to secure the mizen mast, ports, quarter galleries, and stern windows which had been more or less stove in, and to clear the main deck of water. It is remarkable that during the time the wind was at South, there was but little lightning, and not so much rain.

“At 6 p.m. found the mizen-mast badly sprung. At midnight the ship’s head was S.W. by W., driving rapidly to the N.W. The gale still at a

fearful height, barometer 28·00, the sea making a clear sweep over everything, the main deck and cabins again flooded, and all efforts to keep the water under by pumping and bailing ineffectual.

“*Saturday, Sept. 8th.*—At about 2 a.m. the wind had gradually drawn round to east, and at 4h. to E.N.E., but still blowing with great fury. At 7h. the ship gave two or three very heavy weather rolls,—her head gradually drew more towards the wind, and from the grinding of the cables it being evident that the anchors had taken the ground, we sounded in 22 fathoms, gray sand.

“Our awfully perilous situation at this moment may be easily conceived; escape from shipwreck seemed scarcely possible;—the breakers were seen not more than a mile astern,—the sea one continued rolling mass of surf,—and the only consolatory reflection was, that from the soundings we knew that we must be somewhere to the northward of the Florida Light, and consequently with a sandy beach under our lee. At this anxious moment the wind, which had now drawn round to N.N.E., began to fall, and the clouds in the zenith to clear away. At 9h. the barometer had risen gradually to 28·40; the ship, which had happily been held by her anchors for an hour, was found to be driving to the southward, and the interval had allowed us to secure the badly sprung mizen-mast, and to prepare the fore and aft sails for setting. The wind providentially shifted rapidly to the N.W., the focus of the hurricane had crossed the track of the ship, and had left her to the westward. The chain cables by great exertion were hove in, and about 5 p.m. the ship was under her storm sails, with her head off shore and steering to the S.E. The gale then rapidly broke; we obtained an observation of the sun, bore up for the north-west channel under all the sail that we could make, and felt not a little grateful to Providence when passing the white light-house we entered the harbour of Nassau.”

CURRENTS, the Equatorial current runs to the westward between all the Windward islands; it varies much in velocity, but is strongest between Trinidad and Grenada, where it runs at an average rate of about $1\frac{1}{2}$ to 2 knots per hour, sometimes accelerated to three knots. Between the other islands its strength is generally less, but it is swiftest towards the shores of the different islands, though here affected by the diurnal tides. South of Barbados it is frequently very weak; under the lee of each island there is generally slack water, of much service to vessels working to windward. Across the Caribbean Sea the westerly current varies from a half to one knot, until the meridian of Jamaica is reached, where it quickens to as much as $2\frac{1}{4}$ knots as it passes between Cuba and Yucatan into the Gulf of Mexico, whence it emerges as the Florida or Gulf stream, see page 433.

A counter current sets to the eastward, to the southward of the greater Antilles at certain times see pages 270, 301, and 305.

In the Mona passage, and also in the windward passages, the general set of the currents is to the south-west, it is however variable, and much disturbed near the shore, by the tides which are strong and irregular, see page 221.

North of the greater Antilles and amongst the Bahamas a westerly and north-westerly set is felt, in the labyrinth of the Bahamas it is much disturbed by local causes, but the average general set may be considered to be in the direction stated, and to be about half a knot in strength. This requires closely watching by the mariner.

The body of the drift current northward of Cuba, Haiti, and Porto Rico, meeting an opposition at the Bahamas, collects and forms a stream which is turned to the south and east along the north side of that chain of islands.*

FLORIDA or GULF STREAM.—An investigation of the currents of the Gulf stream, between Fowey rocks, Florida, and Gun Cay, Bahamas, during the months of March, April, May, and June, 1885–6, by Lieut. Pillsbury, United States Navy, has developed the following:—

I. The current varies daily, in velocity, at times as much as two or two and a half knots. The greatest velocity is apparently about nine hours before the upper transit of the moon. The variations are more excessive on the west side than on the east.

II. The average daily current varies during the month, the strongest set apparently coming a day or two after the moon's greatest declination. Further observations on this variation are, however, necessary.

III. The axis of the Gulf stream on a line east of the Fowey rocks, (the position of greatest surface flow) was eleven and a half miles from Fowey rock lighthouse, the direction is always within a few degrees of north. The strongest surface current at the axis was five and a quarter knots; the weakest, one and three-quarters knots; the average three and six tenths knots.

IV. The axis of the stream did not change its position with the wind blowing across it. The wind blowing against the current retarded the surface flow; and it is probable that the wind with the current would increase its velocity.

V. The following was the rate of the current in knots at the distances stated, east from the Fowey rocks; at eight miles, $2\frac{6}{10}$ knots; at $11\frac{1}{2}$ miles, $3\frac{6}{10}$ knots; at 15 miles, $3\frac{2}{10}$ knots; at 22 miles, $2\frac{8}{10}$ knots; at 29 miles, $2\frac{4}{10}$ knots; and at 36 miles, $1\frac{8}{10}$ knots.

* Rennel's currents in the Atlantic Ocean, London, 1832, p. 144.

TEMPERATURE OF THE SEA.—The average temperature of the surface of the sea amongst the West India islands and in the Caribbean sea is, in the month of February, 75° to 78° , in May it is from 79° to 80° , in August from 82° to 84° , and in November from 80° to 81° Fahrenheit.

TEMPERATURE OF THE AIR, at Barbados, which may be taken as a favourable average, the temperature throughout the year in the forenoon is about 80° , and in the afternoon about 82° , the maximum 87° and minimum 75° .

MAIL ROUTE.—The royal mail steam packets leave Southampton every fortnight direct for Barbados, the same steamer goes on from Barbados to Jamaica and Colon, returning to Barbados via Jamaica. At Barbados she is met by branch packets that deliver the mails as far as Demerara to the south, and St. Thomas in the north; these again, meet the homeward steamer at Barbados. The royal mail steamers are timed to reach Barbados in 13 days, Jamaica in 18, Colon in 21, St. Thomas in 16, and Demerara in $14\frac{1}{2}$ days. From St. Thomas a branch royal mail packet runs to ports San Juan and Mayaguez in Porto Rico, and to Sta Barbara de Samana and Port-au-Prince, in San Domingo and Haiti.

TELEGRAPHIC COMMUNICATION.—Barbados is connected by cable to St. Vincent, through which island the West India and Panama telegraphic companies cable runs to Grenada, Trinidad, and Demerara, in the south, and to all the principal islands to the north (except Haiti or San Domingo) to Jamaica and on to Colon; from Jamaica it runs to Santiago de Cuba, and connects with the Cuban Sub-marine Telegraph Company, which at Havana joins the International Ocean Telegraph Company and runs through Cay (Key) west to San Carlos in Florida, and there connects with the United States telegraph system. Telegrams for the Bahamas are sent by post from New York or Havana, those for Bermuda by post from New York or from St. Thomas, and those for Haiti or San Domingo by post from Jamaica.

GENERAL REMARKS ON SOME PRINCIPAL PASSAGES ON THE
WEST INDIA STATION ; WITH A TABULATED STATEMENT
OF THOSE MADE BY VARIOUS CLASSES OF H.M.'S SHIPS,
1875-85.

The navigator must remember that it is impossible to lay down fixed tracks, because the winds are not always the same at the same time of the year. The tracks mentioned are those which it is possible the wind will permit of following. Sometimes he will be able to do better than to strictly follow them, at other times he may be driven to do worse.

From the tabulated statement, the duration of any passage about to be undertaken, with probable amount of steam required, may be anticipated.

In making passages, the "Pilot charts for the Atlantic Ocean" for the season of the year should be consulted, as they contain in a condensed form the information that has accumulated for many years. These, in conjunction with the "Current Chart," and the "Remarks on Revolving Storms," form the best guide for making passages.

English Channel to Madeira.—On leaving England with an adverse wind and threatening appearance of weather, with a low barometer the prudent mariner will do well to seek shelter in some safe anchorage, in order to save wear and tear. If however it be determined to continue, the ship should be hauled to the wind on the tack which will best enable her to approach the proper course, without drawing into the Bay of Biscay, which is especially to be avoided, rather than run any risk of this, it will be better to make a long board to the westward, in which a vessel may be assisted by "Rennel's Current," which current is checked if the wind has been to the northward of West, but it is considerably increased with the wind to the southward of West, causing a strong indraught into the bay, and since the westerly winds generally veer to the N.W. if a good offing has been made, the course can afterwards be pursued a point or two free, making allowance for a south-easterly set, the dead reckoning being checked by observations at every possible opportunity. If however a vessel is driven into the bay, refuge may be found in Ferrol, Coruña, Barquero or Vivero, or in extreme cases the ports and roadsteads of France from the Gironde to Brest, &c. are open and safe. Vessels leaving the Lizard with a fair wind should steer W.S.W. to gain an offing, in longitude 10° or 12° W., so as to be able to weather Ushant, from this position a course may be shaped to pass Madeira at any convenient distance ; in the

winter season it is best to pass westward of it, for the strong westerly gales which occur in November, December, and January, produce eddy winds and heavy squalls eastward of the island. Proceeding to the southward from Cape Finisterre it is better to keep off the land in order to escape the northerly current that sets along the land with south-westerly winds, and as westerly winds make this a lee shore.

The passage from the channel to Madeira occupies a week or ten days.

Steam Route to Madeira.—The course adopted by steam vessels carrying mails is to sight Ushant, if possible, passing about 10 miles from it, the same distance from cape Finisterre, thence direct to Madeira, passing generally eastward of Porto Santo.

English Channel to Barbados, or other Windward Islands.—After passing Madeira, vessels aim to cross the parallel of 30° N. in from 25° to 30° W., but they should not contend with adverse winds to do so, the object being to reach the N.E. trade wind as soon as possible. The season of the year must be considered in the Pilot charts as to how far south it will be necessary to go, to ensure holding the trade wind. In making for any of the Windward islands it is better to get in the parallel of the island at least 120 miles to the eastward of it.

English Channel to the Leeward islands.—Vessels bound from Europe to the leeward islands Jamaica, Belize, and the Gulf of Mexico, will find it to their advantage to run through the channel between Antigua and Guadaloupe, which is 30 miles wide; chiefly because there is generally much less current here than farther north or south. It will be better, however, in doing so, to keep the Antigua shore on board, and to sight the island on the parallel of lat. 17° N., taking care to observe the directions already given in page 7, for making Barbados. Vessels sometimes pass between Antigua and Barbuda; this may be done without much risk in the daytime, but by no means in the night; for the soundings are so irregular that in running down it would be difficult to tell whether to haul to the northward or southward.

Those bound to Europe from the southward generally pass close to leeward of Antigua. This navigation, however, requires caution and attention to the lead, taking care not to come within the depth of 10 or 12 fathoms.*

English Channel to Cuba.—The greater number of vessels from Europe to Havana or Matanzas run through the north-west Providence channel (page 434) and close along the western edge of the Great Bahama bank, round the elbow of the double-headed shot cays, thence across towards Guaucos point (in Cuba) out of the stream.† Or they run

* See bank westward of Barbuda, page 106.

† See page 538.

through the Old Bahama channel (page 466). Or if coming from the westward they round cape Antonio (page 433). To any port on the south side of Cuba it is best to pass north of Puerto Rico and San Domingo during the period of south winds (or rainy season) and south of those islands during the period of north winds.

English Channel to Bermuda.—Southern Route.—Sailing vessels, or steam vessels with small power, should, after passing Madeira, steer to the south-westward until within the northern limit of the N.E. trade wind (which will be entered when the sun is in the northern tropic between the parallels of 31° and 32° N., and when it is near the southern tropic between those of 30° and 31° N.), when the course should be altered gradually to the westward, keeping within the limit of the trade wind, cross the meridian of 40° W. in latitude 26° N., which parallel should be preserved till the meridian of 60° W. is reached, when a course for Bermuda may be steered.

Or instead of this route, on a vessel leaving England for Bermuda with an easterly wind it may be found a better way to steer West, and if the wind should veer by the south towards the west, to continue on the port tack, until by changing the vessel could lie its course; if the wind should continue to veer to the northward, and as it some times does to the eastward of north, a vessel on the starboard tack might be allowed to come up with her head to the westward of her direct course, on both tacks she would have sailed on curved lines, the object of which would be to carry her to the westward against the prevailing winds and currents.

There is reason for believing that many of the revolving winds of the winter season originate within the tropics, and that vessels seeking for the steady trade wind, even farther south than the tropic at that period of the year, will frequently be disappointed. How near to the equator the revolving winds originate in this season, is an important point not yet sufficiently observed. The quickest voyage from England to Bermuda therefore may perhaps be made by sailing on a course composed of many curved lines, which cannot be previously laid down, but which must be determined by the winds met with on the voyage.

Barbados to Bermuda.—Vessels will generally fetch to windward of all the islands, hence a direct course to Bermuda seems the best.

Bermuda to Barbados.—Mr. Henry Davy, H.M.S. "Cornwallis," in 1837, writes :—Instead of steering direct I would recommend a S.E. by S. course, the advantage of this will appear should the trade wind be to the southward of east, and it is also a precaution against a leewardly current

This recommendation holds as good now (1886) as when first suggested, it is followed in H.M. ships in making this passage, who endeavour to cross the meridian of 60° W. before entering the tropic, and at times, according to the season of the year, find it advisable to go as far eastward as 56° W. before steering south.

Bermuda to Antigua, or to any of the Islands leeward of it ;—the same instructions as from Bermuda to Barbados hold good for this passage, except that it is not necessary to go to the eastward of 60° W.

Bermuda to Jamaica.—The Turks Island passage or the Mona passage are used, with a slight advantage in time by the former ; the passage is made by first steering to the south-eastward until the meridian of about 62° W. is reached, hence direct to the entrance of either of the above-named passes.

Bermuda to Nassau.—The N.E. Providence channel is always taken, as it is also from Barbados or any other of the Windward islands.

Bermuda to England.—The direct route is preferred, inclining towards the Great Circle in the summer months.

Bermuda to St. Kitts.—The passage between Barbuda and St. Bartholomew is chiefly taken.

Colon to Port Royal (Jamaica).—Most vessels steam along the coast of the main, where they have generally found an easterly current running at the rate of $1\frac{1}{2}$ miles per hour, until well to windward and could fetch Port Royal under sail.

Port Royal to Barbados.—This passage is made by keeping close under the lee of Haiti, and as near as prudent to the unknown south coast of Puerto Rico, it is however a tedious passage, except in full power steamers ; although at times calms, light winds, and an easterly current will be found under the lee of the islands. In working to windward under sail the best way is still in dispute, but in the hurricane months the south side of the Carribean sea is to be preferred, and it is universally followed by the coasters and pilots.

Port Royal to Bermuda.—Through the Windward passage* and thence through the Crooked Island passage. Mariguana or Caicos passage is also used.

Port Royal (Jamaica) to Curacao or to La Guayra.—The course recommended is to steam along the coasts of Jamaica and Haiti, and sail across. When the breeze is too strong to steam thus to windward,

* See page 305, Windward passage.

steam and fore and aft sails have been used across to the main, then steam along the coast.

Honduras to Jamaica.—To make this passage under sail it is recommended to stand across on the starboard tack to the coast of Cuba, and work to windward along that coast, taking advantage of the northerly winds sometimes found there. From the Caymans to Jamaica, keep as near as possible in the latitude of point Nagril, and make short tacks, keeping on the starboard tack by day and on the port tack by night.

West Indies to the English Channel.—The passages given in the tabular statement from Barbados and Port Royal (Jamaica) to Bermuda and the one from Antigua to Portsmouth will be suitable for consultation as to the best route to adopt for making the passage to England. The one great object being to get north into the westerly winds as speedily as possible, and Bermuda lies in the track (or near the best track) for this purpose, though a course east or west of it may be taken according to the direction of the wind met with and the season of the year, a more northerly route being followed in the summer season than in the winter. It is seldom advisable to pass to the eastward of the Azores, but a passage between Corvo and Flores and the other islands of the Azores is recommended by some navigators. If easterly winds are met with after passing the Azores, the vessel should still be kept on the starboard tack, as by so doing westerly winds will probably be sooner found.

The following instructions for making the passage from the English Channel to Halifax, Nova Scotia, are added to the West India Pilot, vol. 2, because Halifax is the summer head-quarters of the North America and West India squadron, although they more properly belong to the Nova Scotia Pilot, from which some portion hereof is taken.

English Channel to Halifax.—Southern Route.—Sailing vessels, or steam vessels of small horse-power, leaving the English channel after making the necessary westing to ensure not being set into the Bay of Biscay, should shape a course for Madeira, or if the wind permit, midway between it and the Azores, and when well into the trade wind should run to the westward until in about 48° W. longitude, when a more northerly course should be pursued, passing about 200 miles from Bermuda, from whence a course may be steered for Halifax, allowing for the Gulf stream setting about E.N.E. (true) from 20 to 70 miles a day, and which attains its greatest velocity in the summer and autumn; its junction with the ordinary sea water is distinctly seen. On crossing the northern limit of the Gulf stream the temperature has been observed to decrease 30° .

Northern Route.—Vessels taking this route, which should only be attempted in the autumn should stand to the northward, crossing the

meridian of 30° W. in 55° N. latitude, then steer gradually to the south-west, endeavour to enter on the bank of Newfoundland about the parallel of $47^{\circ} 30'$ N., passing cape Race at any convenient distance, when a course should be shaped for Halifax. In thick weather the water thermometer should be constantly used; the temperature of the water falls on nearing the bank of Newfoundland. Sable island should be given a wide berth, as it is very dangerous on account of the prevalent fogs and variable currents near it, the lead should be very carefully attended to.

Steam Route.—Full-power steam ships make the passage direct, which leads through the region of icebergs in the months of July and August.

Sailing route.—The late Captain Hare, R.N., having crossed the Atlantic in sailing vessels 111 times up to 1846, is fairly entitled to have his opinion well considered on this subject, he observes, “That ships “ from Scotland in the spring of the year bound to New Brunswick have “ always arrived sooner than those from the English Channel, and ships “ from Liverpool generally arrive before those from the English Channel. “ In making this passage in the spring of the year, I would never go to the “ southward of latitude 46° or 47° N. until I reached the longitude 37° W., “ or thereabout; then edge away to the southward as far as 43° N. to “ avoid icebergs, this parallel I should endeavour to preserve until up to “ cape Sable (if bound to New Brunswick) or Halifax, for it carries you “ to a safe and proper distance from Sable island, a place that cannot be too “ much dreaded, in this parallel you will be without the northern edge of the “ Gulf stream probably assisted by a south-west current from the banks “ until past Sable island.

“ In the fall of the year my track is far more to the northward than in the “ spring, about the middle of October (or thereabout) I generally steer to “ the north-westward until I get as far north as 55° N., and until I enter the “ longitude of 30° W., then edge to the southward to enter on the banks in “ latitude 46° N., shaping again a course to pass 60 miles to the southward “ of Sable island as before, if bound to Halifax and sure of my latitude I “ might be tempted to pass north of Sable island.”

To prove the advantage of a northern track in the fall of the year (writes Captain Hare) I have in one or two instances read in American papers the accounts of very long passages experienced by ships which met heavy gales in latitude 35° and 38° N., while on the same day in latitude 54° N. I had moderate weather from the N.N.E., this encourages me to believe that blowing weather, incident to approaching winter, commences southerly. It may be depended upon, that no ship, however well found, will effect westing in the Gulf stream with a wind from that quarter.

I must add that a strong built well found vessel alone can perform these voyages, and that by unremitting attention and perseverance. The

(old) New York Packet ships when making a winter voyage from Liverpool kept in high latitudes until nearing Newfoundland, this they did for the twofold object of avoiding the tempestuous weather so generally experienced to the southward, and of obtaining fairer winds; the voyage by this route is shortened, and although bad weather must be expected, it is not so violent as further south.

These instructions by Captain Hare for crossing the Atlantic from the English Channel to Halifax are very nearly followed to the present day (1887) by sailing vessels, some being guided by these instructions, others adopting a route from their own experience. The most successful of the regular traders to Halifax being the iron ship *Roseneath*, which had made some 60 or 70 voyages to Halifax, being very seldom beyond the expected time. The Commander preferred to keep north of the Gulf stream, but never hesitated to go south into it if the wind so obliged him.

WEST INDIA PASSAGE TABLE.

From	To	Month.	Number of Days.				Total.	Route; Remarks, &c. &c.
			Under Steam.	Under Sail.	Under Steam and Sail.			
Antigua	Barbados	Aug.	2	1½	2	3	East of Guadeloupe. <i>Blanche</i> , 1879.	
Do.	Barbados	Sept.	1	2	—	3	Passed north of St. Lucia. <i>Garnet</i> , 1883.	
Do.	Barbados	Oct.	2	—	—	2	East of Guadeloupe. <i>Dido</i> , 1884.	
Do.	Barbados	Feb.	3	—	1	4	Passed between St. Vincent and St. Lucia. <i>Argus</i> , 1879.	
Do.	Barbados	Jan.	1½	—	1½	3	East of Guadeloupe. <i>Northampton</i> , 1885.	
Do.	Barbados	Jan.	1	1	1	3	East of Guadeloupe. <i>Fantome</i> , 1885.	
Do.	Halifax	Sept.	—	3	9	12	60 miles west of Bermuda. <i>Garnet</i> , 1883.	
Do.	Port Royal	Sept.	—	—	3	3	Direct. <i>Dido</i> , 1883.	
Do.	Portsmouth	Feb., Mar.	—	29	—	29	Direct. <i>Martin (brig)</i> , 1878.	
Bardados	Bermuda	March	4	7	1	11	East of all islands. <i>Decoy</i> , 1875.	
Do.	Bermuda	April	1½	—	6	7½	East of all islands. <i>Argus</i> , 1878.	
Do.	Bermuda	Dec.	1	2½	5½	9	East of all islands. <i>Blanche</i> , 1879.	
Do.	Bermuda	Oct.	2	7	3	12	<i>Fantome</i> , 1886.	
Do.	Cape Coast Castle.	Dec.	22½	—	—	22½	Direct. <i>Tyne</i> , 1885.	
Do.	Demerara	Jan.	1½	1	½	3½	Nearly direct. <i>Bellerophon</i> , 1875.	
Do.	Demerara	May	1	1	1½	3½	Direct. <i>Blanche</i> , 1879.	
Do.	England	Apr., May.	3	24½	6½	34	Easterly winds prevailed. <i>Active</i> , 1886.	
Do.	La Guayra	June	½	3½	½	4½	Direct. <i>Forester</i> , 1881.	
Do.	Nassau	Dec.	6½	—	—	6½	East of all islands and through N.E. Providence channel. <i>Tyne</i> , 1885.	
Do.	Port Royal	Nov.	5	—	—	5	Direct. <i>Tyne</i> , 1885.	
Do.	Port Royal	March	—	5½	—	5½	Direct. <i>Tourmaline</i> , 1878.	
Benta island	St. Kitt's	Dec.	6	—	—	6	Direct, head wind and heavy sea all the passage. <i>Griffon</i> , 1883.	
Belize	Barbados	Oct.	9	—	—	9	Direct. South of Jamaica. <i>Tyne</i> , 1885.	
Do.	Grand Cayman.	May	1½	—	2½	3½	Anchored at cay Bohel for one night. <i>Druid</i> , 1882.	
Do.	Port Royal	May	9	—	—	9	Direct. <i>Plover</i> , 1877.	
Do.	Port Royal	April	2	—	5	7	Direct. <i>Bullfinch</i> , 1878.	
Do.	St. Lucia, Jamaica.	June	7	13	—	20	Beat to windward under sail. <i>Flamingo</i> , 1881.	
Bermuda	Anguila	Jan.	2½	—	2½	5½	Direct, a squadron in co. <i>Northampton</i> , 1885.	
Do.	Anguila	Jan.	1	—	4	5	Direct, in co. with squadron. <i>Fantome</i> , 1885.	
Do.	Antigua	Jan.	—	1	6	7	Direct. <i>Dryad</i> , 1877.	
Do.	Antigua	Feb.	2½	—	4½	6½	Direct. <i>Argus</i> , 1879.	
Do.	Antigua	Feb.	1½	—	5½	6½	Direct. <i>Plover</i> , 1879.	
Do.	Antigua	Sept.	—	—	9	9	Direct. <i>Dido</i> , 1883.	
Do.	Antigua	June	—	3	6	9	Steered to 59° 30' W. in 23° 40' N., then south. <i>Dido</i> , 1884.	
Do.	Barbados	Dec., Jan.	1½	2½	4	8½	Direct to lat. 22° 18' N. in long. 57° 38' W. <i>Bellerophon</i> , 1875.	
Do.	Barbados	March	3	7	—	10	To long. 59° 48' W. in 23° 30' N. <i>Decoy</i> , 1875.	
Do.	Barbados	Feb.	1½	2½	4½	9	Reached long. 56° 50' W. in 22° 10' N. <i>Bellerophon</i> , 1876.	
Do.	Barbados	June	1	11½	1	13½	Reached long. 57° 25' W. in 16° 36' N. <i>Encounter</i> , 1876.	
Do.	Barbados	May	—	—	6½	6½	Crossed 66° W. long. in 27° 30' N., then direct to Barbados. <i>Rover</i> , 1876.	
Do.	Barbados	Feb.	3½	6½	—	10	Passed over position of Echo bank. <i>Tenedos</i> , 1880.	
Do.	Barbados	Jan.	1	13	1	15	Entered the Trade wind in 21° N. lat. in 59° W. long. <i>Goshawk</i> , 1886.	
Do.	Barbados	Jan.	—	14	—	14	Entered the Trade wind in 22° N. lat. in 60° W. long. <i>Fantome</i> , 1886.	
Do.	Barbados	Feb.	2	10	1	13	Entered the Trade wind in 25° N. lat. in 57° W. long. <i>Active</i> , 1886.	
Do.	Elbow cay, cay Sal.	Feb.	2	7½	½	8½	N.E. and N.W. Providence channel. <i>Blanche</i> , 1880.	

PASSAGES.—WEST INDIA PASSAGE TABLE.

From	To	Month.	Number of Days.			Total.	Route; Remarks, &c. &c.
			Under Steam.	Under Sail.	Under Steam and Sail.		
Bermuda -	Nassau -	May -	4	4	—	8	Direct to Abaco lighthouse. <i>Decoy</i> , 1875.
Do. -	Plymouth	July -	3½	10½	1½	24½	Generally light winds. <i>Woodlark</i> , 1876.
Do. -	Plymouth	Oct., Nov.	4	25½	1½	28	Nearly direct, inclining towards the Great Circle. <i>Druid</i> , 1876.
Do. -	Plymouth	Nov. -	—	22	1	23	Near the Great Circle. <i>Druid</i> , 1876.
Do. -	Plymouth	Aug. -	—	12	10½	22½	Direct. <i>Bullfinch</i> , 1878.
Do. -	Plymouth	Nov. -	2	9	12	23	Direct. <i>Bullfinch</i> , 1878.
Do. -	Plymouth	Dec., Jan.	1½	25	5	31½	Close North of Corvo. <i>Forester</i> , 1881-2.
Do. -	Plymouth	July, Aug.	7½	11	2½	21	Inclining towards the Great Circle. <i>Druid</i> , 1882.
Do. -	Port Royal	Jan. -	2	8	3	13	Mona passage. <i>Dryad</i> , 1875.
Do. -	Port Royal	April -	—	13½	—	13½	Mona passage. <i>Rover</i> , 1877.
Do. -	Port Royal	June -	—	17	3	20	Mona passage. <i>Dryad</i> , 1877.
Do. -	Port Royal	Feb. -	1	3	7	11	Turks island passage. <i>Bullfinch</i> , 1877.
Do. -	Port Royal	Feb. -	—	7	5	12	Mona passage. <i>Bullfinch</i> , 1878.
Do. -	Port Royal	Feb. -	½	17	—	17½	Mona passage. <i>Plover</i> , 1878.
Do. -	Port Royal	Aug. -	1	14½	5½	21	Mona passage. <i>Argus</i> , 1879.
Do. -	Port Royal	Feb. -	1½	4½	4½	9½	Turks island passage. <i>Flamingo</i> , 1881.
Do. -	Port Royal	Dec. -	1½	6½	2½	10½	Mona passage. <i>Druid</i> , 1881.
Do. -	Port Royal	May, June	5	—	5	10	Turks island passage. <i>Fantome</i> , 1883.
Do. -	Port Royal	March -	6	—	5	11	Turks island passage. <i>Phoenix</i> , 1881.
Do. -	Port Royal	Oct. -	1	6	4	11	Turks island passage. <i>Phoenix</i> , 1881.
Do. -	Port Royal	May -	2	6	4	12	Via St. Thomas's, stopped three days at St. Thomas's. <i>Flamingo</i> , 1884.
Do. -	Port Royal	June -	6½	4	—	10½	Turks island passage. <i>Bullfinch</i> , 1884.
Do. -	Portsmouth	Nov. -	½	7½	10	17½	Inclining towards the Great Circle. <i>Encounter</i> , 1877.
Do. -	Port au Prince.	May -	3	3	3	9	Caicos channel, stopping at Matthew Town. <i>Griffon</i> , 1883.
Do. -	Port au Prince.	Dec. -	—	3	4	7	Mouchoir Carre passage. <i>Griffon</i> , 1883.
Do. -	San Juan, Puerto Rico.	Dec. -	—	5	2	7	To long. 64° W. in 23° 38' N., then direct. <i>Garnet</i> , 1883.
Do. -	St. Kitt's -	Feb. -	½	—	5½	6	Passed west of Sombbrero. <i>Argus</i> , 1878.
Do. -	St. Kitt's -	May -	4½	3½	—	8	Between Barbuda and St. Bartholomew and passed west end of St. Kitt's. <i>Garnet</i> , 1883.
Do. -	St. Kitt's -	May -	½	8	—	8½	Between Barbuda and St. Bartholomew and through the Narrows. <i>Flamingo</i> , 1884.
Do. -	St. Lucia -	Jan. -	½	9	—	9½	To 59° W. long. in 27° 16' N., then south and nearly direct. <i>Flamingo</i> , 1882.
Cartagena	Port Royal	Sept. -	1	5	2	8	Direct (steaming clear of Baxo Nuevo and Portland rock). <i>Dryad</i> , 1877.
Do. -	Port Royal	April -	1½	3	½	5	A very strong north current, direct passage. <i>Plover</i> , 1878.
Colon -	Port Royal	Feb. -	2	4	—	6	Steamed 120 miles to eastward, then direct. <i>Dryad</i> , 1876.
Do. -	Port Royal	March -	2½	—	3	5½	Direct. <i>Forester</i> , 1881.
Do. -	Port Royal	Feb. -	3	—	1½	4½	Strong east current near coast, steamed towards Cartagena, then direct. <i>Northampton</i> , 1882.
Do. -	Port Royal	Feb. -	2½	—	2½	5	Steamed towards Cartagena, then direct. <i>Flamingo</i> , 1882.
Curacao	Port Royal	Jan. -	½	3½	½	4	Direct. <i>Woodlark</i> , 1876.
Do. -	St. Thomas's	Dec. -	—	—	4	4	Direct, fore and aft sails only. <i>Dido</i> , 1885.
Demerara	Barbados -	May -	½	1½	½	2½	Direct. <i>Blanche</i> , 1879.
Gambia River.	Bermuda -	Mar., Apr.	6	21	—	27	Direct for 60° W. long. in 28° N., then direct to Bermuda. <i>Encounter</i> , 1876.
Grand Cayman.	Belize -	March -	—	3	2	5	Direct. <i>Bullfinch</i> , 1878.

PASSAGES.—WEST INDIA PASSAGE TABLE.

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From	To	Month.	Number of Days.			Total.	Route; Remarks, &c. &c.
			Under Steam.	Under Sail.	Under Steam and Sail.		
Great Inagua.	Nassau	March	2	—	1	3	Crooked island passage. <i>Northampton</i> , 1885.
Halifax	Antigua	Nov., Dec.	—	—	14	14	Direct between Barbuda and St. Bartholomew. <i>Northampton</i> , 1882.
Do.	Port Royal	Oct.	1½	17½	½	19	Mona passage. <i>Blanche</i> , 1880.
Havana	Bermuda	March	2½	—	1½	8	Florida strait. <i>Bellerophon</i> , 1875.
Do.	Bermuda	March	2½	—	5½	8	Florida strait. <i>Encounter</i> , 1877.
Do.	Bermuda	March	—	10	—	10½	Florida strait. <i>Blanche</i> , 1880.
Do.	Bermuda	April	—	4½	1½	7	Florida strait. <i>Druid</i> , 1881.
Do.	Nassau	Jan.	1	2	1	4	Florida strait and N.W. Providence channel. <i>Pert</i> , 1876.
Do.	Nassau	May	—	3	3	6	Florida strait, calling at cay Sal. <i>Pert</i> , 1876.
La Guayra	Grenada	July	3½	—	—	3½	Direct. <i>Tenedos</i> , 1880.
Do.	Grenada	June	2½	—	½	2½	Steamed along shore, between Margarite island and Cubagua and Coche islands. <i>Forester</i> , 1881.
Do.	Port Royal	Feb.	—	1	5	6	Direct, in co. with squadron. <i>Dryad</i> , 1877.
Do.	Port Royal	June, July	1	5	—	6	Stopping at Curacao two days. <i>Phoenix</i> , 1881.
Do.	Port Royal	Feb.	½	—	5	5½	Direct, in co. with squadron. <i>Encounter</i> , 1877.
Do.	Trinidad	July	2½	—	½	3	Along shore, inside Centinella island, sighted Borracha island through channel between Margarite island and Cubagua and Coche islands, then along shore. <i>Garnet</i> , 1883.
Madeira	Antigua	Jan.	3	11	7	21	Steered for 25° W. in 25° N., then direct. <i>Garnet</i> , 1883.
Do.	Barbados	Dec.	—	22	—	22	Calling at Teneriffe. <i>Sparrowhawk</i> , 1877.
Do.	Barbados	March	2½	16½	—	18½	Very light trades. <i>Tourmaline</i> , 1878.
Do.	Barbados	Nov., Dec.	½	28	—	28½	Sighted Canary islands. <i>Rover</i> , 1885.
Do.	Bermuda	Mar., Apr.	2½	26	—	28½	Lowest latitude, 19° 49' N. <i>Rover</i> , 1876.
Do.	Bermuda	Jan.	5	12	5	22	Lowest latitude, 24° 33' N. <i>Tenedos</i> , 1880.
Do.	Port Royal	Jan.	3½	23	4½	31	Passed between Antigua and Guadalupe. <i>Fantome</i> , 1880.
Morant cays.	Cartagena	Aug., Sep.	1	6	—	7	Direct. <i>Dryad</i> , 1877.
Montego bay.	Bermuda	Feb., Mar.	1	16	—	17	Crooked island passage. <i>Griffon</i> , 1883.
Nassau	Belize	Oct.	5	—	—	5	Florida strait. <i>Tyne</i> , 1885.
Do.	Bermuda	Oct.	½	12	½	13	Direct. <i>Druid</i> , 1876.
Do.	Bermuda	Dec.	—	3	10	13	Direct as possible, very changeable weather. <i>Bullfinch</i> , 1877.
Do.	Bermuda	Oct.	1½	5½	1½	8½	Direct. <i>Plover</i> , 1877.
Do.	Bermuda	March	2½	—	2	4½	Direct. <i>Northampton</i> , 1885.
Do.	Havana	May	—	1	2	3	Over the Banks. <i>Pert</i> , 1876.
Do.	Port Royal	Feb.	1	8	1	10	Turks island passage. <i>Phoenix</i> , 1881.
Do.	Port Royal	Aug.	3½	2½	—	6½	Crooked island passage. <i>Bullfrog</i> , 1884.
Ocho Rios	Nassau	June, July	2½	2½	½	5½	Florida strait and N.W. Providence channel. <i>Fantome</i> , 1880.
Old Providence.	Port Royal	Dec.	—	—	1½	3½	Direct. <i>Phoenix</i> , 1881.
Plymouth	Madeira	March	4	13	—	17	<i>Rover</i> , 1876.
Do.	Madeira	Dec.	—	13	—	13	A schooner. <i>Sparrowhawk</i> , 1877.
Do.	Madeira	Jan., Feb.	7½	4	—	11½	<i>Fantome</i> , 1880.
Do.	Madeira	Nov., Dec.	1	1	7	9	Anchored in Falmouth outer roads for two days. <i>Garnet</i> , 1882.
Do.	Madeira	Nov.	2	11	—	13	Light winds, one day's heavy gale. <i>Active</i> , 1886.
Port Antonio, Jam.	Colon	Aug.	½	6	—	7	Round Morant point, then direct. <i>Rover</i> , 1876.
Port au Prince.	Curacao	Dec.	—	1	9	10	Direct as possible, fore and aft sails. <i>Dido</i> , 1883.
Do.	Nassau	Sept.	2½	3½	1½	7	Crooked island passage. <i>Plover</i> , 1877.

PASSAGES.—WEST INDIA PASSAGE TABLE.

From	To	Month.	Number of Days.			Total.	Route; Remarks, &c. &c.
			Under Steam.	Under Sail.	Under Steam and Sail.		
Port Royal	Barbados -	Nov. -	6	—	—	6½	Direct. <i>Tyne</i> , 1885.
Do.	Barbados -	June -	7½	—	—	7	Kept under the lee of Hayti and Puerto Rico. <i>Rover</i> , 1877.
Do.	Barbados -	Mar., Apr.	15	—	—	15	Calling at Mayaguez, St. Thomas, and Martinique. <i>Tourmaline</i> , 1878.
Do.	Belize -	March -	½	5	—	6½	Direct. <i>Plover</i> , 1877.
Do.	Belize -	May -	6½	5½	—	12	Calling at Grand Cayman and Corrientes bay, Cuba. <i>Flamingo</i> , 1881.
Do.	Belize -	May -	½	8	—	8½	Fair wind and fine weather. <i>Goshawk</i> , 1886.
Do.	Belize -	Oct. -	½	8½	—	9½	Direct. Sighted Swan island. <i>Flamingo</i> , 1881.
Do.	Bermuda -	Dec. -	1	½	6	7½	Crooked island passage. <i>Rover</i> , 1876.
Do.	Bermuda -	July, Aug.	3	—	8	11	Turks island passage. <i>Bullfinch</i> , 1878.
Do.	Bermuda -	Jan. -	4½	5	3	12½	Mariguana channel. <i>Plover</i> , 1879.
Do.	Bermuda -	Mar., Apr.	4½	4½	3½	12½	Via Port au Prince, and through Caicos channel. <i>Plover</i> , 1879.
Do.	Bermuda -	Nov. -	5	5½	½	10½	Crooked island passage. <i>Fantome</i> , 1880.
Do.	Bermuda -	March -	2	—	6	8	Crooked island passage. <i>Northampton</i> , 1882.
Do.	Bermuda -	Apr., May	7½	2½	6	16	Calling at Savana-la-mer, Havana, Cay Sal, and Nassau. <i>Flamingo</i> , 1882.
Do.	Bermuda -	July -	3½	½	4½	8½	Caicos passage. <i>Druid</i> , 1882.
Do.	Bermuda -	March -	5	1	4	10	Caicos passage. <i>Phoenix</i> , 1881.
Do.	Bermuda -	Nov. -	4	4	7	15	Crooked island passage. <i>Fantome</i> , 1883.
Do.	Bermuda -	March -	2	5	12	19	Calling at Havana and Charlestown, two days at each place. <i>Flamingo</i> , 1884.
Do.	Bermuda -	Oct. -	—	32	2	34	Florida strait. <i>Dryad</i> , 1877.
Do.	Bermuda -	Sept., Oct.	6½	2	—	8½	Caicos channel. <i>Dido</i> , 1885.
Do.	Bermuda -	March -	8½	—	1	9½	Stopping at Great Inagua and Turks island. <i>Fantome</i> , 1885.
Do.	Blewfield creek.	Jan. -	½	3½	1½	5	(Chiriqui lagoon.) Direct passage. <i>Contest</i> , 1882.
Do.	Cartagena -	Jan., Feb.	½	3½	½	4	Direct. <i>Plover</i> , 1877.
Do.	Cartagena -	March -	½	6½	½	7½	Via Santa Marta and Savanilla. <i>Plover</i> , 1878.
Do.	Cien Fuegos	March -	½	3	—	3½	Round West end of Jamaica. <i>Dryad</i> , 1875.
Do.	Colon -	Feb. -	—	4	—	4	Direct. <i>Dryad</i> , 1875.
Do.	Curacoa -	Jan. -	2	—	6	8	Direct, too rough to steam to windward along San Domingo. <i>Woodlark</i> , 1876.
Do.	Colon -	Nov. -	—	4½	½	5	Direct. <i>Woodlark</i> , 1875.
Do.	Greytown -	Sept. -	1½	3½	—	5	Direct. <i>Flamingo</i> , 1881.
Do.	Greytown -	March -	—	5	—	5	Fair wind all the way. <i>Goshawk</i> , 1886.
Do.	Guantanamo.	May -	1	1	—	2	Round Morant point. <i>Rover</i> , 1877.
Do.	Halifax -	Sept. -	—	6	12	18	Crooked island passage. <i>Griffon</i> , 1883.
Do.	Halifax -	June, July	5	2	8	15	Turks island passage. <i>Phoenix</i> , 1881.
Do.	Havana -	March -	1	5	—	6	Round cape Antonio. <i>Bellerophon</i> , 1875.
Do.	Havana -	March -	2	—	4	6	Squadron in co. <i>Dryad</i> , 1877.
Do.	Havana -	March -	½	—	5½	6	Squadron in co. <i>Encounter</i> , 1877.
Do.	Havana -	March -	2½	2	1½	6	<i>Druid</i> , 1881.
Do.	Havana -	Jan. -	3	3	—	6	<i>Druid</i> , 1882.
Do.	La Guayra	May -	2	—	6	8	Steamed East for 100 miles, then direct. <i>Phoenix</i> , 1881.
Do.	La Guayra	May -	1½	—	3½	4½	Direct, strong trade and heavy sea throughout. <i>Fantome</i> , 1880.
Do.	Nassau -	Sept. -	2½	3½	½	6½	Through Crooked island passage. <i>Druid</i> , 1876.
Do.	Nassau -	May -	3	—	4	7	Through Crooked island passage. <i>Bullfinch</i> , 1877.
Do.	Nassau -	Sept. -	1	20½	3½	25	Through Florida strait and N.W. Providence channel. <i>Plover</i> , 1878.

PASSAGES.—WEST INDIA PASSAGE TABLE. xliii

From	To	Month.	Number of Days.			Total.	Route; Remarks, &c. &c.
			Under Steam.	Under Sail.	Under Steam and Sail.		
Port Royal	Nassau	Aug.	1	9½	—	10	Through Crooked island passage. <i>Flamingo</i> , 1884.
Do.	Nassau	July	1	3½	—	4½	Through Crooked island passage. <i>Bullfrog</i> , 1884.
Do.	Old Providence.	May	1	3½	—	3½	Nearly direct. <i>Druid</i> , 1882.
Do.	Old Providence.	Dec.	—	—	2½	2½	A sloop in tow. <i>Phania</i> , 1881.
Do.	Santa Marta.	July	1	3½	½	5	Direct. <i>Woodlark</i> , 1875.
Do.	St. Andrew's	April	—	3½	½	4½	Direct. <i>Woodlark</i> , 1876.
Do.	St. Andrew's	March	1	3½	½	3½	Direct. <i>Forester</i> , 1881.
Do.	St. Kitt's	April	5½	—	½	6	Close South of all the islands. <i>Forester</i> , 1881.
Do.	St. Kitt's	Feb., Mar.	4½	3½	—	8	Through windward passage, North of Haiti, through Mona passage. <i>Garnet</i> , 1883.
Do.	Turks island.	Oct.	3½	7	—	10½	Calling at Navassa, and steamed through Tortuga channel. <i>Dryad</i> , 1877.
Do.	Turks island.	March	3½	—	—	3½	Direct. <i>Forester</i> , 1881.
Portsmouth	Madeira	Feb.	3	9	—	12	<i>Tourmaline</i> , 1878.
Puerto Cabello.	Barbados	Sept.	3½	—	—	3½	Direct. <i>Rover</i> , 1877.
Roatan	Port Royal	Nov.	6½	—	1	7½	Direct. <i>Flamingo</i> , 1881.
San Juan, P. Rico.	St. Kitt's	Dec.	2	2	1	5	Passed between St. Thomas and Culibrita islands. <i>Garnet</i> , 1883.
Santa Marta.	Port Royal	March	1	2½	½	3½	Direct. <i>Plover</i> , 1877.
Santiago de Cuba.	Bermuda	May	4	5½	3½	12½	Through Crooked island passage. <i>Woodlark</i> , 1876.
Sierra Leone.	Barbados	Sept., Oct.	12	—	—	12	Direct. <i>Tyne</i> , 1885.
Do.	Bermuda	March, April.	10½	20½	—	40	Very unsettled trade wind. <i>Bullfrog</i> , 1884.
St. Andrew's island.	Port Royal	Dec.	3½	—	½	4½	Direct. <i>Woodlark</i> , 1875.
Do.	Port Royal	Sept.	4½	2½	—	6½	Direct as possible. <i>Flamingo</i> , 1881.
St. Kitt's	Barbados	June	2½	—	—	2½	West of Guadaloupe and between Martinique and Dominica. <i>Tenedos</i> , 1880.
Do.	Barbados	April	—	1	2	3	Between Martinique and St. Lucia. <i>Forester</i> , 1881.
Do.	Barbados	March	½	1	1	2½	<i>Active</i> , 1886.
Do.	Bermuda	June	—	—	5	5	Direct. <i>Dido</i> , 1883.
Do.	Bermuda	April	—	4	9	13	As direct as possible. <i>Dido</i> , 1884.
Do.	Trinidad	April	—	4	1	5	Direct. <i>Tenedos</i> , 1880.
Do.	Trinidad	Feb.	—	—	2	2	Direct. <i>Dido</i> , 1885.
St. Lucia	Bermuda	Jan.	1	2½	3½	7	Steered N.E. to long. 59° W. in 16° N. then almost direct. <i>Active</i> , 1886.
Do.	Colon	Feb.	—	7	3	10	Direct, East current 1½ miles per hour, near the coast. <i>Northampton</i> , 1882.
Do.	Colon	Feb.	—	7½	½	8½	Direct. <i>Flamingo</i> , 1882.
St. Thomas's	Bermuda	Feb.	3½	—	2½	6½	Direct. <i>Bellerophon</i> , 1876.
Do.	Bermuda	Sept.	1½	6½	1	9	Direct. <i>Forester</i> , 1881.
Do.	Bermuda	March	1½	—	5½	7	Steered for 67° W. along in 25° N., then direct. <i>Garnet</i> , 1883.
Savanna	Port Royal	Sept.	2	—	2	4	Direct. <i>Woodlark</i> , 1875.
Teneriffe	Barbados	Dec.	—	17	—	17	A steady trade wind right across. <i>Active</i> , 1886.
Trinidad	Port Royal	May	1	8½	—	8½	Direct. <i>Fantome</i> , 1880.
Turks island.	Bermuda	April	1½	4½	1½	7	Direct. <i>Flamingo</i> , 1880.
Do.	Port Royal	Nov.	—	5½	—	5½	Direct, light winds. <i>Dryad</i> , 1875.

CHAPTER I.

THE WINDWARD LESSER ANTILLES; BARBADOS, GRENADA, THE GRENADINES, ST. VINCENT, AND ST. LUCIA.

VARIATION IN 1887.

Barbados	-	0° 40' W.		St. Vincent	-	0° 10' W.
Grenada	-	0° 15' E.		St. Lucia	-	0° 30' W.

THIS volume contains a description of the several groups frequently distinguished by the terms Windward and Leeward, or Lesser and Greater Antilles, or Caribbee islands, together with the Bahama and Bermuda islands.

BARBADOS.

This island is the easternmost of the extensive group termed the Antilles, Caribbee, or Windward islands, and consequently the first land-fall of vessels proceeding from Europe to the islands to leeward of it, or to the ports on the northern shore of Venezuela and New Granada. The exact date of discovery is unknown, but it was probably first seen by the Portuguese in about the year 1600, and taken possession of by the English in 1605, in whose hands it has since remained. In form, the island is an irregular triangle or pear shaped, with the pointed end to the north; its length in a N.N.W. and S.S.E. direction is about 18 miles, and the breadth between the extreme east point and Bridgetown 12 miles, the whole island containing an area of about 166 square miles.*

Notwithstanding its small extent, Barbados presents considerable variety of surface, as valley, hill, table-land, &c. A deep valley running almost east from Bridgetown divides the island into two parts, of which the northern is by much the larger. Near the centre of the latter, mount Hillaby, the highest part of the island, rises 1,104 feet above the sea. The general appearance of the island is low and level.

* The description of this island is taken from the Survey by Staff Commander J. Parsons, 1868, and from Sir R. Schomburgk's History of Barbados, 1848. See Admiralty charts :—Barbados island, No. 2,485; scale, $m = 1.5$ inches, and No. 956, Guadaloupe to Trinidad.

From the west coast the land rises in distinct successive terraces, interrupted by numerous and deep ravines, to the central ridge; from which, and principally from mount Hillaby, hills of a conical form range in a north-east direction towards the sea: this high land is named Scotland; the hills are rugged and worn by the heavy rains and torrents which pour down their sides. Between the east and south points the ground is nearly level, sloping gently to the sea cliffs; while from the east to the north point the outline is broken and irregular. In clear weather the highest hills may be seen at a distance of about 40 miles.

The north, west, and south parts of the island consist of rocks of coral-line limestone, with beds of calcareous marl, containing numerous recent shells of various species; the east is composed of strata of siliceous sandstone, intermixed with ferruginous matter, calcareous sandstone, passing into siliceous limestone, different kinds of clay, selenite, earthy marls, frequently containing minute fragments of pumice, strata of volcanic ashes, seams of bitumen, and springs of petroleum.

The rivers are small except during the rainy season, when they are much increased; the average yearly rainfall amounts to 58 inches, and the greatest known occurred in October 1867, when 6 inches fell in four hours. There are several chalybeate springs, containing chiefly iron, carbonic acid, and fixed alkali, in different proportions. Barbados is considered to be one of the healthiest islands in the West Indies, and the climate, though warm, is very salubrious. In the forenoon, the mean temperature during the year is about 80°, and in the afternoon 82°; the minimum being 75°, and the maximum 87°.

The island was devastated by a hurricane in 1675, and by another in October 1780; the latter left hardly a building standing, and killed many of the inhabitants, and the loss of human life was estimated at between 3,000 and 4,000 souls, and of property to more than 1,000,000*l*. Between that and the last great hurricane of 1831 there were several others, the severest of which was that of October 1819, but these were less disastrous. The hurricane which desolated the island in 1831 exceeded in violence any of the former. The number of persons who lost their lives is said to have amounted to upwards of 2,000, and by some to more than 5,000; and the loss of property to nearly 1,602,800*l*.

The island is divided into 11 parishes or districts. Bridgetown, the capital, is situated mainly north of a rivulet in Carlisle bay, at the south-west end of the island, but it extends along the shores of the bay for nearly two miles. Though irregularly built, it contains several handsome houses, and a large square adorned with a good statue of Nelson. It has a cathedral, which is spacious and plain, its tower scarcely rising above

the roof, for fear of hurricanes, for which reason also the churches are without steeples. Besides the churches, there are several chapels and 100 schools. A college or grammar school, founded by General Codrington, formerly governor, is pleasantly situated on the eastern side of the island. At the southern extremity of the town is St. Ann castle, with its spacious barracks and extensive parade ground. The town is abundantly supplied with excellent water, led in from Newcastle on the east coast, and an effective system of hydrants is maintained.

The chief staple articles produced in Barbados are sugar, rum, arrow-root, aloes, and cotton. The population in 1881 was 171,860, of which 16,054 were white, and the remainder coloured and black. In 1884, 1,229 British and foreign vessels, amounting to 403,825 tons, entered inwards. In 1884 the value of the imports was 1,156,229*l.*, and of the exports 1,318,878*l.*

North-east coast.—From Kitridge point, the east end of Barbados, the coast, forming a slight indentation, trends about N.W. to the north point, and is formed of rocky cliffs varying from 50 to 800 feet in height, intersected by sandy bays and beaches, which are skirted by a coral reef, always breaking, and which encircles almost the whole island; in this space the reef extends from about a quarter to half a mile from the shore. Conset bay affords shelter for boats, but is difficult of access.

The east end of the island is about 50 or 60 feet high, and continues flat for about 2 miles inland, when it becomes more elevated, and at 3 miles west of the east point is Moncrieffe hill signal post, which stands 521 feet above the level of the sea. At 3 or 4 miles to the north-west, the island begins to rise in rugged hills abruptly from the shore, and at 8 miles from the north end, and about midway between the eastern and western sides of the island is mount Hillaby, the highest peak of the island. The high ridge terminates at the coast, about 4 miles from the north point of the island, in a remarkable hill, named Pico Teneriffe, 269 feet high, which at a distance appears almost detached from the shore.

North point.—The coast from Pico Teneriffe is composed entirely of low rugged cliffs from 40 to 60 feet in height, and sweeps round the north end of the island, in a semicircle, to Harrison point on the opposite shore, and between these two points the island is about $4\frac{1}{2}$ miles broad. For the first mile from the north point inland, the ground is level and open, and thence commences to rise gradually to the southward. The reef in this space borders the shore at the distance of about half a mile.

West coast.—From Harrison point the coast trends nearly South for about 13 miles to Pelican island, at the north end of Carlisle bay; the shore is generally low, but a short distance inland it begins to rise in

distinct successive terraces, interrupted by ravines towards the central ridge. These terraces may be traced all the way from Bridgetown, to near Harrison point, where they terminate in a bold bluff. The shore is slightly indented with sand beaches, the points being fringed by coral reefs, which off Harrison point extend nearly half a mile and are dangerous.

Speights town, the most considerable place next to Bridgetown, is situated about $3\frac{1}{2}$ miles to the southward of Harrison point, and off it there is anchorage, but the roadstead is not frequented, as it is found more convenient to ship the produce in droghers, or small craft, and convey it to the vessels in Carlisle bay.

James or Hole town, a small village about 4 miles farther to the southward, has also anchorage off it, and the roadstead is used for the same purpose as that of Speights town.

Pelican and Long shoals.—Pelican shoals lie about 4 miles southward of Hole town, $1\frac{1}{2}$ miles northward of Pelican island, and half a mile off shore. They are nearly dry, with 5 fathoms water about a cable outside them. Detached coral patches lie about 6 cables off Spring garden point, westward of Pelican shoals, the shoalest of which, named Long shoal, has 4 fathoms water on it, and is marked by a bell buoy with Pelican island quarantine station bearing S.E. $\frac{1}{2}$ S., distant $1\frac{1}{10}$ miles. Pelican island is a small, low, rocky islet with a quarantine building, painted black, lying about $1\frac{1}{2}$ cables from the shore, and forms the north end of Carlisle bay. St. Ann clock tower, in line with gateway, S.E. by E., leads $2\frac{1}{2}$ cables outside the foul ground extending from Pelican island.

CARLISLE BAY,* the principal anchorage, along the shores of which is situated Bridgetown, the capital of Barbados, is an indentation of about half a mile, and formed between Pelican island and Needham point, which bear from each other about N.N.W. $\frac{3}{4}$ W. and S.S.E. $\frac{3}{4}$ E., distant $1\frac{1}{2}$ miles.

Banks.—Clearing marks.—From Needham point, which may be easily known by the forts and signal staff at its extremity, a shallow rocky spit extends 3 cables to the westward, and a red buoy with staff and vane is moored on it in 5 fathoms water, with the garrison clock in line with the south-west angle of Beckwith fort bearing E. $\frac{1}{2}$ N., and the outer house on Pelican island N.N.W.; but as the buoy occasionally breaks adrift, vessels approaching from the eastward should not cross the spit until they have brought the northern extreme point in one with the east end of Pelican island bearing N. by W. $\frac{3}{4}$ W., and when the flagstaff of

* See Admiralty chart :—Carlisle bay, with view, No. 502; scale, $m = 11 \cdot 9$ inches.

fort Charles on the point is in one with St. Ann castle, they can haul to the north-eastward and anchor as convenient.

In the northern part of the bay there are two coral patches, having from 4 to 5 fathoms water on them, but they will be avoided by not standing farther in that direction than to bring the refinery chimneys (standing on the shore in the centre of the bay) E. $\frac{1}{4}$ S. The leading mark for the spit off Needham point leads also westward of the knolls, and the flagstaff of St. Ann castle in one with the north-east corner of the dockyard storehouses, (a white diamond on a black square has been painted on the centre of these storehouses, but it is not easily seen,) S.E. $\frac{1}{4}$ E., leads between them, and just outside the foul ground off the south-west side of Pelican island.

LIGHTS.—A *fixed* light is exhibited from a light tower, painted white, on Needham point, at an elevation of 60 feet above the sea. The light shows *red* when bearing to the northward of East, and *white* when to the southward of East. The white light may be seen in clear weather from about 7 miles, and the red light 3 miles.

A fixed *red* light is exhibited at the adjutant-general's wharf, visible from a distance of half a mile.

Anchorage.—Merchant vessels anchor* in the northern part of the bay; the mail steamers have two mooring buoys in 7 and 9 fathoms, with the refinery chimneys in line E. by N. $\frac{1}{2}$ N. These buoys (red) are useful for men of war picking up their anchorage in the southern part of the bay, which is usually clear. For a large vessel, the best berth is in 16 fathoms with gateway and clock tower in line S.E. by E., and Clapham mill open north of Britton's mill E. $\frac{1}{4}$ N. Smaller vessels anchor inshore of this according to draught. The bottom is foul and uneven in many parts, but an anchor is seldom lost. In the bay the tides are weak and irregular.

Vessels of suitable draught moor alongside the wharves of the carénage, which has 14 feet at its entrance at low water, and from 12 to 14 feet within.

Supplies.—Coal and all other supplies can be purchased; water is delivered on board from tanks. The naval coal depôt is close to the engineer's wharf, whence the coal is brought alongside in lighters.

Tides.—It is high water, full and change, at Barbados at 3h. 0m.; springs rise 3 feet, neaps 1 foot 6 inches, but it is irregular.

Telegraphs.—Barbados is in telegraphic communication with the principal West India islands, with Demerara, and with Great Britain *via* the United States.

* There is a merchant vessel's mooring buoy in 7 fathoms W. $\frac{1}{2}$ N., $4\frac{1}{2}$ cables from the tall refinery chimney.

Railway.—A railway crosses the island from Carlisle bay to Conset point, and thence by the east coast to St. Andrews. The terminus in Carlisle bay is at Bridgetown, just inside the inner basin of the Carenage.

SOUTH COAST.—Oistin bay.—The coast from Needham point runs in an E. by S. direction $4\frac{1}{4}$ miles to Oistin town, and from thence it bends gradually round to the south-east for $1\frac{1}{2}$ miles to the extreme south point of Barbados, forming Oistin bay, in which there is anchorage for small vessels in from 5 to 10 fathoms water; clear ground will be found in about 6 fathoms, with Christ church N. by E. and Kendal point S.E. by E. $\frac{1}{2}$ E. In hauling up for this anchorage, take care to give a good berth to the South spit, which extends to the south-west nearly three-quarters of a mile from South point. The whole of this shore is flat and low, but at a short distance inland the ground rises somewhat in terraces, and half a mile northward of Christ church attains the height of 180 feet.

Cobbler reef.—From South point the coast trends about N.E. 9 miles to Kitridge point, curving outwards a little about midway. The shore is flat, and composed chiefly of bold rocky cliffs from 50 to 60 feet high; in some places, however, the cliffs have been undermined by the sea, and fallen in huge masses on the beach beneath. This is the most dangerous part of the island, coral reefs extending almost continuously at from 2 to 3 cables off shore, having from one to 4 feet water, and generally breaking heavily for the whole distance. There is a boat channel inside these shoals. Abreast New Fall cliff and 3 cables from the coast is the south-west extreme of Cobbler reef, which extends at about the same distance off shore nearly as far as Lords castle, Long bay, having two gaps in the ridge, of $2\frac{1}{2}$ and $1\frac{3}{4}$ fathoms. Here the reef increases its distance from the coast to $1\frac{1}{10}$ miles off Palmetto bay, which is 7 cables southward of Kitridge point. The Cobbler reef here is about half a mile in width, with from 2 to 8 feet water, and breaks heavily even in the finest weather; inside the reef there are 3 and 4 fathoms, with smooth water. Eastward of the Cobbler reef, and nearly $1\frac{1}{2}$ miles from the coast, a remarkable coral ridge, with from 7 to 10 fathoms on it, curves and extends to the south-west at nearly an uniform distance off shore till abreast the South point. Between this and the inner reefs there are from 12 to 26 fathoms. To seaward of these reefs, the water quickly deepens to the 100-fathoms line, which will be found about 2 miles off shore. At spring tides there are overfalls off the Cobbler and South point reefs.

LIGHTS.—South Point.—A lighthouse 90 feet high, and painted in alternate red and white bands, stands 200 yards inshore of South point. From it is exhibited, at an elevation of 145 feet above the sea, a *red*

light, which *revolves* once every *minute*; after an eclipse of 12 seconds, it again appears, gradually increasing in 24 seconds to its greatest brilliancy, and then in 24 seconds more is eclipsed. Coming from the north-eastward the light is first seen when bearing S.W. by W., and should be kept well open in order to clear Cobbler reef. It is visible from the distance of about 18 miles.

Ragged point.—A white lighthouse, 97 feet high, stands 300 yards within the cliff of Ragged point, from which is exhibited, at an elevation of 213 feet above the sea, a *revolving* white light, giving flashes every *two minutes*, and in clear weather should be seen from a distance of 21 miles.

On account of the prevailing strong current running westward on to the Cobbler reef, mariners are cautioned in closing the land to keep well to the north-eastward of the light.

DIRECTIONS.—Vessels from Europe or from the south-eastward, when within about 120 miles of the meridian of Barbados, should endeavour to keep on the parallel of South point, or in lat. 13° N. In these latitudes, where the atmosphere is in general so clear and favourable (except in the rainy season), this may be readily accomplished by observing at day dawn and evening twilight the meridian altitudes of stars north and south, and which, with a little practice, will give results not far from the truth. This is a means so simple, and yet so neglected, that we cannot too strongly bring it to the notice of those navigating any part of this sea where the currents are strong and variable. Observations for longitude may at the same periods be equally depended upon to within very narrow limits.

It has frequently been observed that, at the distance of about 200 to 240 miles eastward of the island, muddy discoloured water is sometimes met with, having the appearance of soundings, most probably caused by the *débris* thrown out of the great rivers on the adjacent coast during the rainy season, and it is said to afford a means of checking the longitude; it will be prudent, however, not to put too much confidence in this remark. At the same time we warn the mariner who has only a single chronometer not to rely altogether on its results, as it is seldom indeed that a watch will retain its original rate on being subject to the increased temperature within the tropics. If South point light has been made from the south-east, care should be taken not to approach the shore within 3 miles, until it bears N.E., when a course may be shaped for Needham point.

When approaching Barbados from the northward, keep if possible well to the eastward of the island, in order to pass to windward of it, guarding against the westerly set, and having rounded Cobbler reef at the distance of 3 miles, the coast may be skirted about 2 miles off shore. Should it be sighted in the night from the north-east, the light on Ragged point will be

the guide, remembering that to clear the Cobbler reef it must not be brought to bear northward of W.N.W. till South point light is seen.

Should vessels coming from this direction get to leeward and be obliged to pass westward of the island, a berth of about 2 miles should be given to the reef off the north-west point, and the shore must be approached carefully. Soundings extend some short distance outside the reefs, 20 fathoms being found at about half a mile; a depth of not less than 10 fathoms will clear them. Approaching Carlisle bay from the northward, do not haul round Pelican island until the clock tower is in one with the gateway bearing S.E. by E.

At Night.—Vessels bound to Carlisle bay from the southward should give the *revolving red* light on South point a berth of at least 2 or 3 miles, and after passing it may haul up about W. by N. $\frac{1}{2}$ N. for the bay, when the *red* light on Needham point will soon be seen. Keep the lead going when nearing the point, and on hauling up into the bay when the *white* light is seen, bear in mind that the rocky spit from Needham point is steep-to, the anchoring ground is rocky and uneven in places, and at times crowded with vessels.

In approaching the bay from the northward, when Needham point light is seen, bring it to bear eastward of S.E. $\frac{1}{2}$ E., to clear the shoals off Pelican island.

Current.*—When beating up to Barbados from the westward, endeavour to keep directly under its lee in order to avoid the current which generally sets strong to the westward. Sometimes, however, the current varies its direction to N.W., and even as far as North, particularly between Barbados and Tobago, where the directions and velocity are considerably influenced by the wind. In the rainy season they are especially variable. Velocity ranges from 10 to 24 miles a day. The direction of the current must also be borne in mind when approaching Barbados from the eastward.

Winds and Weather.—January is generally dry at Barbados; the breeze sets in early, and it is altogether one of the finest and most healthy months of the year. February partakes of the same character. March and April are the driest months. May is also dry in the early part, but rain sets in towards the end. In June the breeze is light, the clouds are heavy, and thunder and lightning set in with frequent showers. July is most oppressive, the regular trade wind is interrupted, and breezes frequently prevail from S.W. and West; rain descends in torrents. August and September are very similar, with calms and light airs from the

* See *Admiralty Atlas*, Pilot Charts for the Atlantic Ocean, published in 1875; Chart, Pacific, Atlantic, and Indian, stream and drift current, No. 2640; and Current notes on Chart Guadeloupe to Trinidad, No. 956.

southward. October, towards the middle, becomes drier, and the refreshing trade wind sets in after thunder storms. November is still rainy, the winds variable, and not unfrequently from the S.W. December has almost daily slight showers, but the month is generally cool, and the trade wind becomes steady.

GRENADA.

This island* was discovered by Columbus in his third voyage in 1498, was first colonized by the French in 1650, and has been an English possession since 1783. It is about 17 miles in length N.N.E. and S.S.W., 8 miles in breadth, and contains an area of 133 square miles. Throughout its whole extent it is traversed by a chain of irregular mountains, reaching in the centre of the island from 2,300 to 2,750 feet above the sea. Mount St. Catherine, about one-third from the north end of the island, is the highest, whilst the S.E. mountain and mount Sinai to the southward range respectively 2,359 and 2,330 feet high.

The appearance of the island is that of a gradual rise of hills from the shore to the mountains in the centre, resembling in its principal features other of the West India volcanic islands, but dissimilar to those of calcareous formation, such as Barbados, Barbuda, or the Bahamas. There are three lakes or rather large ponds in the island, formed as basins, having all the appearance of extinct craters; that of Grand Etang, 7 miles from St. George and 1,759 feet above the sea, is 13 acres in extent, 16 feet deep, and the source of the Great and largest river.

Antoine lake, in the north-east part of the island, has more the appearance of a crater than the Grand Etang; the ridge of hills encircling it are almost round, the lake is more than 52 acres in extent, 39 feet deep, and 6 feet below the level of the sea. Levira pond, also at the north-east end of the island, is 12 feet deep, but the hills enclosing it are not so perfect as the others. Strangers visiting the island are generally taken to see the Grand Etang; the road is passable in dry weather, the views and scenery decidedly beautiful, and the excursion a pleasant one.

Grenada is a well watered country, every valley has a stream, and the larger ones never dry. During rainy weather they sometimes become impassable, and at various times accidents have occurred to persons trying to cross them. Nearly all the beds of the rivers are full of large slippery boulders of water-worn trap rock with deep holes between them, and the beaches where the streams run into the sea are generally soft. Horses occasionally get deep into these quicksands. These streams are almost all used as the principal motive power for making sugar, and enable the

* Chiefly from the survey and remarks by John Parsons, Master, R.N., 1860. See Admiralty chart :—Island of Grenada, with plans and views, No. 2,821; scale, $m = 1$ inch; also Plan No. 504, St. George harbour; scale, $m = 20$ in.

planter to grind his canes with certainty at a cheaper rate than he could with steam, or wind which is not always certain.

There are also several hot chalybeate and sulphurous springs, and veins of the natural magnet are found in various parts of the island. The average quantity of rain falling per annum, from observations by Dr. Stephenson, is 70 inches. No long continuous rain seems to occur, but showers constantly, and at times every five minutes, with bright sunshine between: they are very inconvenient when engaged in out-door work, and it is almost impossible to keep dry, which is dangerous, as getting wet in the tropics often brings a cold followed by fever.

During July, August, and September the temperature in the low grounds is from 85° to 90°. From December to March it is a little cooler, and at night the thermometer is sometimes down to 72° and not above 80° in the day. The maximum temperature in the low grounds for five years was 89°, the minimum 77°, and the medium 83°. The hottest season is from June to October, when the thermometer ranges from 77° to 88°.

The island has the character of possessing a healthy climate, but it does not appear to have any advantage in this respect over the other West India islands. Fevers are often prevalent in all stages, from slightly bilious to yellow fever; deaths from the latter are by no means infrequent, and persons who have been some time in the island are not exempt from them. The negroes in their conversation with each other use a French patois; the greater part of them can speak English, but they prefer and use the former, which is encouraged by an interpreter being allowed for the courts.

The population of the island in 1881 was 42,403. The chief exports are sugar, coffee, rum, cocoa, molasses, and cotton. In 1884 the value of the imports was 153,421*l.* and of the exports 213,118*l.*

Small cutters of 20 to 30 tons are employed in collecting the produce from the east and south side of the island for the shipping in St. George harbour. The boats used for taking the sugar hogsheads from the shore are called Moses boats; they are of a strong tub-like construction, and stand the surf in the bays. The native seamen manage these boats very well, but as sailors in general they are not very useful, being exacting and having a fictitious idea of their own value, it is a great trial of patience to have anything to do with them.

The island rises from a bank on which are the Grenadines, and which extends to the south-west of the island, and probably joins the Margarita bank. The 100-fathoms line of soundings is at an average distance of 7 miles from the east coast of the island and from the islets to the north of it; the bank has about 27 fathoms near the edge, decreasing to about 20 fathoms at a half to a mile from the shore. The western edge of the bank is much nearer, averaging only two-thirds of a mile from the island.

It will be seen on looking at the chart that there is but a narrow vein of deep water from all the southern harbours or inlets of Grenada to the clear bank outside, and that banks on which there are less than 5 fathoms water extend off the adjacent points; this being the general feature of all, increases the difficulty of taking ships into them, as in almost all cases, from the wooded appearance of the island, no natural leading marks can be given, and as the courses in are principally circuitous, it will be necessary for the utmost caution to be used in navigating them.

At the upper part of the carénage in St. George harbour, vessels may heave down and refit, but artificers are indifferent. There is a colonial hospital for seamen and others, the charges being 1s. a day for maintenance, and 1*l.* to the medical attendant for cure.

Gales are of rare occurrence at Grenada, but strong trade winds, almost approaching them in strength, sometimes blow for weeks, detaining the coasting vessels in port. The usual trade wind varies from N.E. to S.E., and there is no land wind. Occasionally, when the trade wind falls, calms and light airs from the westward will be felt on the lee side of the island. The island is nearly free from hurricanes, two only having occurred since the year 1760, viz., 12th August 1768, and 10th and 11th October 1780, and were not then particularly violent.

CURRENT and TIDES.—Between Grenada and Trinidad, the westerly current may be especially strong, ranging from 24 to 72 miles a day, when the trade is at its height.

Off the bank souhtward of Grenada, the current generally sets 2 knots an hour to the westward. On the bank it is checked by the ebb tide, which sets round the south-west point of the island and along the south shore, but which is only felt for 2 or 3 hours, whilst the flood tide increased by current runs for 8 and 9 hours to the westward. Off Grand Bacolet, on the south-east side of the island, where the ebb scarcely reaches, the current united to the flood stream runs down strong for 6 hours, and weak for 2 hours; while the ebb tide overcomes the current only for 4 hours.

During the wet season (from June to the fall of the year,) the ebb is often entirely overcome by the current, probably caused by the water discharged from the South American rivers. Therefore a vessel from St. George to Grenville bay should go round the north end of the island, as it is scarcely possible to work past Great Bacolet bay. Scarcely any tide or current is felt under the lee of Grenada, and if any, it is quite uncertain, except close along shore, where it is also weak. The water in the southern harbours is unaffected by the tide.

The following rule is used by the island seamen for determining the time of the turn of the stream. From the time of the moon's rising until her superior transit or passing the meridian, the stream sets to the east-

ward; from the superior transit until she sets, it runs westward; then from the time of the moon's setting until her inferior transit, the stream runs to the eastward again; from the inferior transit until she rises it runs to the westward. The ebb stream, however, has been found to set eastward or to windward later by $1\frac{1}{2}$ or 2 hours, although at particular points close in shore the above rule is nearly correct, which applies also to the Grenadines.

Directions.—Vessels approaching Grenada from the north-east must guard against the effect of the equatorial current, or indraught into the Caribbean sea, which meeting the north-east shore of South America, becomes concentrated and passes Grenada with accelerated force;* it will be felt slightly running across the Atlantic, if far south, but when in the longitude of Barbados will generally be found setting to the W.N.W. at from one to sometimes 3 miles an hour, for which an allowance must be made. Having made the north-east part of the island during daylight, and bound to St. George in the south-west, a vessel may pass through either of the channels north of Grenada, or run round its south shore, and work up from the south-west point to the town. The three main channels between Grenada and Carriacou are deep, safe, and cannot be mistaken; they are always used by those well acquainted with the navigation.

The first channel commencing from Grenada, is between Levera, a conical-shaped island 343 feet high, lying close off the north-east point of Grenada, and London bridge, a remarkable islet or rock, 75 feet high, with a hole in it, two smaller islets near it, and a rock uncovered at 2 cables to the south-west of it. A bank with 6 to 10 fathoms water surrounds these rocks, and E. $\frac{3}{4}$ N., distance one mile from them, is a bank with 8 fathoms water over it. In taking this channel steer midway between the rocks and Levera island, and the least depth of water will be 17 fathoms.

The channel north of London bridge rocks, or between them and isle de Caille is clear of danger, and carries 23 fathoms close to the latter. In passing through give the London bridge rocks a berth of more than a third of a mile.

The channel between Diamond islet or Kick'em Jenny, and the islets south of the island of Carriacou, is 5 miles wide, clear of danger, and carries over the bank from 25 to 30 fathoms water. A shoal with 16 feet water over it, lies W. by S. $\frac{1}{3}$ S., 4 cables from the Bonaparte rocks, at the south end of the Carriacou group, which is the only danger to be avoided.

* Captain Boxer, H.M.S. *Tourmaline*, 1878.—I wish to call attention to very strong currents to the eastward of the islands from Grenada to Guadaloupe. In May, we had an average of 2 miles per hour to the N.N.W., while off the S.W. end of St. Lucia, we only just held our own when steaming 6 knots.

After passing through either of the above channels, the west coast of Grenada may be approached to the distance of half a mile until off the town of St. George. The only dangers near which, for a vessel of more than 18 feet draught, are the Annas and Three fathoms shoals rising from a bank, extending from the south point of entrance to the harbour, which will be avoided by not going farther to the southward than to bring fort George point on with the south end of the military hospital, bearing E. $\frac{1}{3}$ S., until the harbour-master arrives on board; or a vessel may round fort George point at the distance of 2 cables and anchor.

Should a vessel prefer to run round the south end of the island, keep from $1\frac{1}{4}$ to 2 miles from the coast to avoid the shallow ground which extends off all the southern points of the island, until near the Porpoise rocks off Prickly point, which may be passed at the distance of half a mile, but in rounding Glover island, and Saline point, which is bold, perpendicular, and 100 feet high, in a heavy ship, keep fully one mile off to avoid the curve of the coast bank of 21 feet between the island and point, and the Seringapatam shoal. After passing Saline point, so called from a salt pond, mount Moritz open of St. Eloy point will lead to the northward clear of all the shoals, or keep without the 10-fathoms line of soundings, the eye will assist, as under that depth the bottom here is easily seen.

Staff-Commander Kiddle, H.M.S. *Royal Alfred*, 1868, remarks that St. Eloy point is so thickly covered with trees and grass, that its outline cannot be recognised.

ST. GEORGE HARBOUR.*—St. George, the principal town in the island, stands on a point of land ranging from 115 to 180 feet high, which forms the harbour commonly called the carénage, in a bay of the same name, between St. Eloy point on the north and Long or Goat point $2\frac{1}{2}$ miles to the southward of it. The 100-fathoms line of soundings west of fort George point is only $1\frac{1}{4}$ miles from it, and the bank off the town is intersected by veins of deep water. It affords, however, excellent anchoring ground, but it is necessary to guard against the inconvenience of anchoring in the deep-water holes.

A ground swell sets in here from the month of November to March, sometimes causing a swell in the carénage; on the 28th and 29th November 1858 the water was forced into the market square, and some of the streets filled with sand. This ground swell takes place in the same month throughout all the islands. The locality of the harbour or carénage may be easily known by the extensive fortified heights immediately above it, which reach 750 feet above the sea. The north point of entrance, on

* See Admiralty plan:—St. George harbour and views, No. 504; scale, $m = 20$ inches; and plan on chart of Grenada, No. 2,821.

which is fort George with the town north of it, is a bold bluff headland, whilst on the hill on the south side of entrance is the harbour-master's house and flagstaff.

LIGHT.—A fixed white light is shown from the flagstaff of fort George which is visible, 3 to 4 miles, but at times, owing probably to some peculiar state of the atmosphere, this light is visible much further.

The length of the harbour is about $4\frac{1}{2}$ cables, and its breadth varies, but from the western shore to the shoals on the east side it is less than $1\frac{3}{4}$ cables across, which diminishes at the head to one cable. On its south-east side is a large indentation with shallow water, the southern part of which, separated from the northern by a point of land, is somewhat circular, about $2\frac{1}{2}$ cables in diameter, and in the centre from 20 to 25 feet deep; this latter part is called the lagoon. Although small the harbour is secure, and is entered by vessels of the largest draught through a deep channel carrying from 23 to 11 fathoms water to the anchorage. The harbour-master acts as pilot. The mail steamers mooring buoy and a hauling-off buoy are in the harbour, but neither are to be depended upon; the coaling jetty is destroyed. The usual anchorage for vessels of war is in the bay.

The Annas and Three Fathoms shoals.—From the south point of entrance to the harbour, a bank about a third of a mile in breadth, with an average depth of 4 fathoms on it, extends westward for about three-quarters of a mile. There are, however, shoaler patches on it with 19 and 20 feet water over them. The Annas shoal, the north-west of these, is half a mile from fort George point. A square-shaped buoy, surmounted by a staff and cone, is moored in 19 feet water on the south-west part of this shoal, with fort George point bearing E. $\frac{3}{4}$ N. distant $5\frac{1}{2}$ cables. The south extreme of the point on with the south end of the military hospital, bearing E. $\frac{1}{2}$ S., leads rather less than a cable to the north of it. The Three fathoms banks are from one to 2 cables south of the Annas, and 2 cables south-eastward of them are other patches, having only 16 feet water on it. The right extreme of fort George point on with the governor's house, N.E. by E. $\frac{1}{8}$ E., leads to the southward of them.

Supplies.—Fresh beef and vegetables can be obtained, and an abundance of water from a pipe on the east side of the carénage. Fuel is scarce and dear, although the island is covered with wood. Sea-fish is not plentiful at Grenada, and no great variety is exposed for sale; there are, however, turtle, barracouta, grouper, snapper, jack, kingfish, Spanish mackerel, bonetta, albicore, cray fish, and other tropical fishes; the mountain streams have abundance of lobster prawns, mud fish and eels, and at particular seasons a small fish called tritri, exactly like whitebait. The West India Mail Company had a supply of coals here, but it cannot be depended upon.

Directions.—Having mount Moritz, the first high hill from Boismorice point, open of St. Eloy point (not easily recognised), bring the extreme of fort George point on with the south end of the military hospital, a large building on the first ridge inland, E. $\frac{1}{3}$ S. This mark will lead rather less than a cable to the northward of the north-west 20-foot patch of the Annas shoal; be careful, therefore, not to open any part of the hospital to the southward of the point. When the square chapel tower with four turrets is in line with the spire of the church N.E. by E. $\frac{2}{3}$ E., haul up quickly for the south end of the sand in Martin bay, or the southern rocky extreme of Martin bay in line with a peak having two trees on its summit S.E. $\frac{3}{4}$ S. leads down, until the end of Martin wharf (at the south point of entrance to the harbour) comes on with the extreme of the Ballast cliff, a rocky point one cable beyond it; keep on this line for the distance of about a cable, or until the buildings in the outer bay are shut in with fort George point, the course will then be the Governor's house in line with the only one that stands on the point of the carénage N.E. $\frac{1}{2}$ E., anchoring as convenient in the harbour.

Sailing vessels from the southward whose draught will admit of crossing the Annas shoal, should make a tack into Grand Ance bay, to take advantage of the flaws of wind which occasionally come from the south-east, and which enable them to lay well up for the carénage.

Anchor about a cable off the coal wharf, or in the middle of the carénage. If intending to make any stay, it will be requisite to moor, with open hawse to the south-west, as there is but little room to swing at single anchor. In leaving the harbour, it will be necessary to place the vessel's head in the right direction before starting, and in a vessel of 26 feet draught, the elbows of the channel should be buoyed.

Anchorage.—The best anchorage in St. George bay for a ship of large draught is with fort George flagstaff in line with the south end of the high wall of fort Frederick, the highest of the forts on Richmond hill, bearing about E. $\frac{1}{3}$ S., and Boismorice point N. $\frac{1}{2}$ W., in 7 fathoms water, sandy bottom, a short half mile from the shore. Small vessels may anchor farther inshore, and also in Grand Ance and Martin bays.

Tides.—It is high water, full and change, in St. George harbour at 2h. 40m.; springs rise $1\frac{1}{2}$ feet, and neaps 8 inches. An extraordinary high tide may rise $2\frac{1}{4}$ feet.

Grand Mal bay.—St. Eloy point, about 420 feet high, is the next north of the town, with a reef extending a cable from it; no other reef exists from this to the north-west part of the island, and the shore may be approached close all the way. To the northward of St. Eloy point is Grand Mal bay, where the water is smooth, and affords good

anchorage on either side of a vein of deep water in the middle of the bay. In crossing this bay, vessels are liable to sudden and heavy gusts of wind, and more or less in all the western bays.

Anchorage.—There is good anchorage on a 5-fathoms bank, extending from the point between Beau Séjour and Perseverance or Halifax bays, by keeping the south-west point of the island open of Boismorice point. The bottom may be seen and a vessel may conveniently land or take produce from either bay.

Goyave or Charlotte town is $2\frac{3}{4}$ miles northward of Black bay point, the north extreme of Perseverance bay. There is anchorage S.W. of the village, 2 cables from the shore, in 7 fathoms water.

Grand Pauvre or St. Mark.—The anchorage in the bay of St. Mark off the village of that name is not so good as that off Goyave and the bays south of it. It is exposed to the north winds; but as they seldom blow strong, vessels often anchor here in 10 or 11 fathoms water, about $2\frac{1}{4}$ cables from the shore.

Anchorage.—To the north-west of St. Mark are Crayfish and Du Quesne bays, where anchorage will be found close inshore. Between the latter and David bay the coast bank extends a little off, and vessels may anchor in 7 fathoms water, 3 cables from the shore.

Sauteurs or St. Patrick bay.—To the eastward of David point, the north-west extreme of Grenada, is Laurant point; shallow water extends off about a quarter of a mile from both points. One mile south-east from the latter is the village of Sauteurs or St. Patrick, in a bay of the same name. Some rocks extend to the north-west from the point forming the east side of the bay, which shelters small boats only. The extremity of the point is a high perpendicular cliff, where it is said the last of the Caribs, in their despair, took a final leap into the sea. The hill was therefore called le morne des Sauteurs, or the hill of the Leapers.

Irvins bay, eastward of Sauteurs, is the principal anchorage on the north side of Grenada, where about one-half of the annual crop of the island is shipped. Vessels generally moor with open hawse to the north-east, on a 7-fathoms bank extending from the shore. It is recommended to drop the outer anchor with the south end of the island of Levera in line with the north extreme of Grenada, and to place the starboard or inshore anchor to the south-eastward, with about 70 fathoms of cable on the outer, and 30 fathoms on the inner anchor; the ship will then be about 4 cables from the shore. This anchorage is exposed, and the wind occasionally blows hard from N.N.E.; it is not, however, dangerous in the spring of the year, the holding ground being good. Droggers and small

vessels may take shelter in Levera bay, under the lee of the island of the same name.

Sandy and Green islands.*—The anchorages under these islands are safe and easy of access, and vessels might load from the shipping place at Levera, but as the lee tide sets strong round Bedford point, the north-east extreme of Grenada, and the trade wind tends to increase it, there would be considerable delay in loading vessels at either of these anchorages. Sandy island is surrounded by a reef which extends southward about a quarter of a mile. The south side of Green island is also foul a cable off.

The coast from Bedford point runs nearly South for 6 miles to Grenville bay; it is an open sandy shore with shallows off it, exposed to the whole force of the trade wind, and on which the sea breaks, and in strong breezes everywhere within the 5-fathoms line of soundings, as it does generally on the whole of the east and south coasts. Off this part of the coast are the Bird, Antony, Conference, and Telescope islets or rocks; the former is the easternmost, nearly $3\frac{1}{2}$ miles from Bedford point, and 50 feet high; the latter islet lies nearly three-quarters of a mile off the point of the same name, is 65 feet high, and steep-to.

Grenville bay and village, on the east side of Grenada, between Telescope point and Marquis island, $1\frac{1}{2}$ miles apart, is the second place of importance in the island, and vessels of 400 tons load here at moorings. The bay is encumbered with reefs, and there is much difficulty and danger in entering, and sometimes a protracted delay in leaving it. Vessels lie under cover of the end of an outer reef from the open Atlantic until lightened to 12 feet draught, and in the same place whilst loading above it. Within the inner reef it is smooth and safe for vessels of 10 feet draught, but it is necessary to warp out through the channel between the reefs for a long half mile to sea, which requires the finest weather, with the wind well to the northward, but droghers of 30 tons can work out.

There are no distinct marks for entering this bay: two small poles a few feet high are erected, which can only be seen with difficulty by those having local knowledge, consequently the bay should not be entered without the aid of a pilot.

Caution.—In coming in from seaward for Grenville bay, it will be necessary to guard against being set to leeward by the current. Here it runs so strong to the south-west that a vessel missing the bay will have to go round the island and again come in from the north-east. The stream

* See plan :—North-east point of Grenada and adjacent islands, on Admiralty chart, No. 2,821.

striking Grenada on its eastern face, turns along shore both to the north-west and south-west, and which at this point is not overcome by the tide.

St. Andrew bay.—At the south end of Grenville bay is Marquis island, inside which is St. Andrew bay and village, the latter consisting of a few small huts. The mark for going in between the shoals on either side is the western extreme of Marquis island on with the north of two houses or stores on Grenville bay beach N.W. $\frac{3}{4}$ N.; anchor midway between the reefs with the west end of the island North. It is difficult to get out of this bay, and it is hardly fit for any vessel but a drogher.

The coast.—From Great Bacolet point south of St. Andrew bay to St. David point, 5 miles to the south-west, are several small bays which are used by droghers for the shipment of produce from the adjacent estates, but at times this is effected with difficulty, for this part of the island is exposed, and the bays are more or less open.

St. David harbour is the first of any importance on the south coast, in coming from the eastward. The entrance is formed by St. David point, and the reef extending from Middle point immediately westward of it: from the latter a dangerous ledge extends to the southward beyond St. David point. The harbour is capable of affording accommodation for vessels of moderate draught, and temporary anchorage will also be found in Little Bacolet bay to the westward of the reef; the latter is easier of access.

Water may be obtained here from the river of Little Bacolet, which empties itself close to the anchorage.

Directions.—Bring a prominent building, a church about half way up the hills, to bear N. $\frac{1}{2}$ E., and mount Sinai, the highest southern mountain, N. by W. $\frac{3}{4}$ W., the square cliffy point of St. David will then be recognized, which with Little Bacolet point forms a larger indentation than the bays to windward of it. In entering the harbour, steer midway between St. David point, which is foul, and the reef extending from Middle point. In a sailing vessel keep sufficiently near the weather shore and be in readiness to anchor should the flaws of wind come too much from the northward, then warp in and anchor East of Middle point in $5\frac{1}{2}$ fathoms of water. In leaving, it will be necessary to have the wind to the northward of east and to close with the weather shore before standing out of the harbour.

Bacaye harbour.*—At about a mile to the westward of Little Bacolet bay is the harbour of Bacaye. It lies within the projecting point of Westerhall and affords excellent anchorage for small vessels in 4

* See enlarged plan of part of the South coast of Grenada, on Admiralty chart, No. 2,821.

fathoms water. It is, however, necessary to warp out in fine weather as far to windward as the north-east bank of Little Bacaye, so as to weather the rocks off Westerhall point. Little Bacaye has a hole of deep water with a sheltering reef.

Caliveney harbour is a small basin extending east and west about half a mile in extent, to the westward of Bacaye, and separated from it by a narrow neck of land. The entrance will be known by Westerhall point trending to the eastward, with light-coloured cliffs on the south-east side, and having three separate hills on it. Fort Jeudy point, 70 feet high, to the westward stretches well to the southward, and has a detached rock off it.

Directions.—Having made out the entrance of the harbour, steer N.W., midway between the shallows at the south extreme of Westerhall point, and those from the eastern part of fort Jeudy point, through the lane of deep water until within the basin, then anchor in the eastern part in $3\frac{1}{2}$ or 4 fathoms. It will be necessary to warp out, unless the wind should be from the northward.

Port Egmont, westward of fort Jeudy point, is an inlet one mile in length and $1\frac{1}{4}$ cables wide, carrying 8 fathoms water to the upper part, where there is a narrow passage to an inner harbour, landlocked, 4 and $5\frac{1}{2}$ fathoms deep, with 21 feet water at the entrance; and where vessels may lay hidden from seaward. At the head of this harbour the French landed 3,000 troops in the year 1779.

There is secure anchorage for small vessels on the west side of Adam islet, south of Egmont point, which forms the west side of entrance to the port, but it is difficult to get to sea, the course out being S.E.

Directions.—Bring the east extreme of Gray islet north of Adam islet, on with the extreme point of the west side of the harbour, and a hill to the northward of it bearing about N. by W. $\frac{3}{4}$ W., which will lead to the entrance of the harbour; when the land to the eastward of fort Jeudy point is shut in, steer more to the northward, skirting the weather bank, and should the wind be so far to the northward as N.E., be prepared to anchor quickly when the flaws take the vessel, and then warp in. There is no room to work in or out of this harbour, but a vessel will be able to sail in with the wind to the southward of East, or out with the wind to the northward of it.

Clarkes Court bay.—The entrance to this bay is formed by Caliveney and Hog* islands, and the shoals and reefs extending from them. It is larger than port Egmont, capable of holding a large number

* Hog island, Grenville bay, and Green island were the three stations at Grenada used to observe the total eclipse of the sun, 29th August 1886. There was another station on Carriacou, Grenadines.

of vessels, and would present no difficulty in entering under steam, were the shallows buoyed. The anchoring ground is about a mile in length, and 3 cables in breadth, in 7 and 8 fathoms water, muddy bottom. The passage is through a narrow vein of deep water between the banks on either side, with 2 to 4 fathoms on them. Here vessels may lie quite secure even in a hurricane. There are three shoals in the bay, one in the north-east, and one in the south-west, both nearly dry; and one with 6 feet water over it, in the northern part.

Directions.—Being to the eastward of Caliveney island, approach it with caution, and bring the two eastern points of Hog island in line bearing N.N.W. $\frac{5}{8}$ W., taking care not to go leeward of this mark. When the south extreme of Caliveney island is in line with fort Jeudy point, haul up midway between the reefs, or close with the weather shore, and anchor in the bay where convenient, avoiding the shoals before mentioned.

Anchorage.—There is good anchorage for small vessels between Hog island and the main in 4 fathoms water; the channel is narrow, but may be taken in fine weather.

Mount Hardman bay is also a safe anchorage in 4 or 5 fathoms water, but the channel to it is tortuous. It may, however, be used by small vessels by keeping the south point of Hog island bearing about N. $\frac{1}{4}$ W. until at a distance of half a mile from it; then steer N.W. $\frac{1}{2}$ W. for mount Hardman point, and through the reefs by the eye, the water being smooth.

Prickly bay lies to the westward of Prickly point, the most southern of Grenada; it is easy of access, and affords good temporary anchorage for vessels of 18 feet draught. There is a shoal with $1\frac{1}{2}$ fathoms water on it at about a quarter of a mile from the head of the bay not distinctly seen. To the westward are True Blue and Hardy bays, which may be used by vessels of 15 feet draught.

Directions.—A vessel from the eastward should steer a quarter of a mile to the southward of the Porpoise rocks, and haul up for Prickly point, passing it at the distance of a cable over a bar of 25 feet water, and anchor where convenient in 6 to 8 fathoms, keeping southward of the shoal at the head of the bay. A little to the westward of the track in, abreast Prickly point, there is some shoal ground with 21 feet over it.

The Porpoises are a cluster of rocks about a cable in extent, 3 feet above water, steep-to, and lying S.S.E. $\frac{1}{4}$ E. 6 cables from Prickly point, E. by S. $1\frac{3}{4}$ miles from the south end of Glover island, and $1\frac{1}{4}$ cables within the 10-fathoms line of soundings. About a third of a mile E. by S. of them is a shoal spot with $3\frac{1}{2}$ fathoms water on it.

Glover island.—At $1\frac{1}{4}$ miles S.E. from Saline point, the south-west extreme of Grenada, and five-eighths of a mile from the shore, is Glover island, 41 feet high, which at a distance appears like a sail. Small vessels find convenient anchorage under its lee, in waiting for tide, when working to windward along the south shore.

Seringapatam shoal, with 21 feetwater on it, on which H.M. Ship of that name struck in 1839, lies S.W. $\frac{1}{4}$ W. $3\frac{1}{2}$ cables from Saline point. This shoal is about $1\frac{1}{2}$ cables in extent, with 6 and 7 fathoms water around it. The sea over it is always in a disturbed state. Vessels of 16 feet draught may pass Saline point at the distance of a cable.

At $11\frac{1}{2}$ miles W. by S. $\frac{3}{4}$ S. from Saline point, are some shallow patches, and on one of them only 29 feet water.

Long Point shoal.—At rather more than 2 miles north-eastward of Saline point is Long or Goat point, and $4\frac{1}{2}$ cables West of the latter, is a dangerous shoal, with only 2 feet water over it, and although not always seen, the sea generally breaks on it. The east extreme of fort George point on with the government house (a large red brick building on the first ridge) bearing N.E. by E., or the extreme of St. Eloy point on with mount Moritz (the first high hill running up from Boismorice point), N.E. $\frac{3}{4}$ N., leads to the westward of the shoal.

There is a narrow channel inside the bank which can be used in case of necessity, but it will be prudent otherwise to pass westward of it.

Anchorage.—There is good anchorage in 5 or 6 fathoms water, on the bank extending to the south-west from Long point shoal, at rather more than a mile to the north-east of Saline point, and a long half mile from the shore. This anchorage is the resort of the American whaling vessels in bad weather, or for the purpose of boiling oil during the season from February to May. There is a hole 10 to 11 fathoms deep nearer the shore, about three-quarters of a mile in extent.

THE GRENADINES.

This chain of about 100 islands and rocks extends for 60 miles between the islands of Grenada and St. Vincent. They were discovered with the adjacent islands by Columbus in 1498, and were probably settled about the same time as Grenada by the French in 1650. They are of moderate height, none exceeding 1,110 feet, and free from outer dangers so as to render an approach to them safe either by day or moonlight nights, and there are several channels between them. The eastern edge of the bank, or 100-fathoms line of soundings, is 10 miles from the islands, with depths between ranging from 10 to 25 fathoms, whilst the bank to the westward does not extend nearly so far.

De Caille and Ronde islets.—Rather more than $1\frac{1}{2}$ miles to the northward of the London bridge islets or rocks (75 feet high), off the north-west end of Grenada, is Caille islet, 242 feet high, and close to the north of it isle Ronde, 518 feet high. There is a narrow channel between them having 3 fathoms of water, but which breaks during strong winds. There are passages between the Sister rocks to the westward, and also between them and Ronde islet. The Sisters are two groups of islets or rocks, 160 and 85 feet high, at about half and nearly a mile respectively west of the south-west end of Ronde islet.

Between Ronde and Diamond islet, or Kick'em Jenny, 688 feet high, is a passage less than half a mile wide, carrying 7 fathoms the least water. In the centre of the channel there is a deep hole with 39 fathoms water in it. The tide runs strong through this channel. The Tantes, 250 feet high, lie $1\frac{1}{4}$ miles eastward of the north part of Ronde islet, free from hidden danger, and may be passed close to on either side. The channel between them and Ronde islet is deep and clear, but the tide being strong, it is not recommended.

Anchorage, with the usual trade wind, for small vessels in convenient depths will be found under the lea of Caille islet; in the south and north-west bays of isle Ronde; and on the west side of the Tantes.

Large and Frigate islets* are the largest of a number of islets and rocks, which, with Saline, White, Mushroom, Rose, and Bonaparte, form a group at the south end of Carriacou island. Between the Bonaparte rocks at the south extreme of the group there is a narrow channel 9 fathoms deep, but a rock almost dry lies a little to the northward of the fairway, which renders it unfit to pass through. In the channel between Large islet and the Bonaparte rocks, is a shoal stretching to the northward from the latter, and one with 3 fathoms water on it, at half a mile to the north-west of the rocks, and nearly the same distance south-west of the west end of Large islet. The tide here runs with great strength, which renders it dangerous to use this channel, or to approach the rocks on the eastern side, unless in cases of extreme necessity. A rock uncovered one foot lies $1\frac{1}{4}$ cables westward of Large islet.

Frigate channel, between Large and Frigate islets, is narrow but clear of danger, and may be used by passing to the southward of Rose rock, 32 feet high. There is also a channel carrying 5 fathoms water, between Rose rock and Frigate islet.

Saline channels.—The channel between Frigate and Saline islets is ~~3~~ cables wide, carries 18 fathoms water, and may be used from

* See Admiralty chart :—Grenadines, from Carriacou to Battowia, with views, No. 2,872; scale, $m = 1 \cdot 0$ inch.

east to west by any sized ship. A rock, one foot above water, lies N.W. 2 cables from the north-west point of Frigate islet. There is also a narrow channel with 4 fathoms water in it northward of Saline island, between it and Cassada rocks (20 feet high) and White islet. Also a channel 8 to 10 fathoms deep on the north side of Cassada rocks and White islet and the reef adjoining them. In using this latter channel pass about half a mile westward of White islet, and southward of Mushroom islet. The latter may be passed close to on the south side.

There is a narrow passage to the northward between Mushroom islet and Little Mushroom, but rocks above water lie off the south-west point of Carriacou, at the distance of $1\frac{1}{2}$ cables. The above channels can be taken only from east to west with the usual trade winds, except by steamers. Small vessels having local knowledge, with the assistance of the tide, may work through them.

Anchorage for small vessels, in 5 fathoms water, will be found in the north-west bay of Large islet, one cable from the shore. Also, on the north-west side of Frigate islet. Between Saline islet and Cassada rocks and reef there is good shelter for small vessels, taking care not to be set to leeward on White islet.

CARRIACOU, the largest of the Grenadines, is $6\frac{2}{3}$ miles in length in a N.E. and S.W. direction, and $2\frac{1}{2}$ miles extreme breadth, with its highest part reaching 980 feet above the sea. The eastern and southern sides are more or less bordered by reefs above water, which protect shallow anchorages inside them. The western side of the island is clearer, and the water deeper, and there are two good anchorages for large vessels. The island exports a small quantity of sugar and cotton, and carries on a small trade with Grenada and Trinidad, but depends mainly on the former for its own supplies. The value of its imports and exports are included with those of Grenada.

Wood is plentiful at Carriacou, but water is scarcely to be had, as there are no running streams, and the inhabitants depend on rain for their supply.

Tyrell bay, called also S.W. or Great carénage bay, at the west end of the island, is an indentation formed by two points, one projecting to the north-west, the other to the south-west. The inner part of the bay is circular and more than half a mile in diameter. Large vessels may anchor in the northern and outer part of the bay, in from 15 to 5 fathoms water, sandy bottom, at about 2 cables from the shore; small vessels anchor in the inner part in from 5 to 2 fathoms. A reef extends to the northward from the south side of the bay for nearly 2 cables, and a shoal with $1\frac{1}{2}$ fathoms water on it, lies in the northern part, both within the line

of anchorage for large vessels. Small vessels can pass between and above them almost up to the beach.

In the northern part of this bay, inside the low land, is a lagoon nearly half a mile in length east and west, with from 4 to 26 feet water in it. The entrance to it, called the *carénage*, is through a lane of deep water northward of the $1\frac{1}{2}$ -fathom shoal in the north part of the bay. With the extreme of Carriacou on with the centre of Diamond islet, in 5 fathoms water, a vessel will be in the fairway of the channel; but it will be necessary to warp in by the eye, as the channel is only 60 yards wide. Vessels of 18 feet draught, if not too long, might manage to get in the outer part of the lagoon for careening, or safety in a hurricane; the land, however, is swampy with mangroves, among which are quantities of oysters, and musquitos are plentiful.

The Sister rocks, 73 feet high, lie westward 6 cables from the west point of Carriacou, with a shoal extending E.S.E. from them nearly a cable. The west point of Carriacou (the land here rising from 200 to 600 feet high) is also foul for about the same distance. The channel between the point and rocks is otherwise clear and deep.

Hillsborough bay or Grand Ance.—From Cistern point, projecting a little northward from the west point of the island, the shore curves to the eastward and northward, forming Hillsborough bay, on the shore of which stands the little village of that name, and off it is the principal anchorage in Carriacou. Nearly half a mile northward of Cistern point is Mabouya island, 135 feet high, about the same distance eastward of which is a low sandy islet with trees 30 feet high. At one mile N.E. $\frac{3}{4}$ E. from the east end of Sandy islet, and the same distance from the village, is the small isle of Jack a Dan, 33 feet high. A shoal with 4 feet water on it, lies between Jack a Dan and Craigstone point east of it, rather nearer the point than the islet, leaving a narrow channel carrying 7 fathoms water between Jack a Dan and the shoal. The passage between the shoal and the shore has 16 feet in it.

A bank $1\frac{1}{2}$ miles in extent east and west, with 5 to 7 fathoms water on it, lies one mile north-west of the north part of the island, where vessels may anchor if necessary.

Directions.—The north point of Carriacou is clear and may be passed at a distance of 2 cables. Approaching the anchorage in Hillsborough bay, a vessel may pass close to Jack a Dan on its west side, and anchor in 14 fathoms water, sand and coral, with the isle bearing N. by W., distant 3 cables, and Sandy isle on with the Sister rocks. If necessary, a vessel may anchor farther to the eastward, but not in less than 7 fathoms, as from this depth the water suddenly shoals to 2 fathoms, and the wind

sometimes comes from the north-west, causing a swell. Small vessels can go in almost to the beach. The landing is exceedingly good, except when interrupted by the north-west swell. Anchorage for large ships may also be taken in 17 fathoms, with Jack a Dan bearing S.E., distant one mile.

In 1876 H.M.S. *Encounter* visited Hillsborough bay, and Captain Bradshaw observes :—Carriacou is a pretty undulating island with good anchorage in Hillsborough bay. It contains 4,000 inhabitants, of which 160 are whites. Sugar-growing has been entirely given up. Cotton is the principal export. Sheep and cattle are bred largely, and a good trade in them is carried on with Trinidad. Several small vessels are built yearly. On the whole this island seemed more flourishing than many of the larger ones.

Watering and Grand bays, on the east side of Carriacou, are protected by reefs, which are uncovered and skirt the whole of this side of the island at from one-third to a mile distant. The northern is called Limlair or Watering bay, the southern Grand bay, off two estates of the same name, and they afford anchorage for small vessels of 9 feet draught. There are three channels for entering, but that between the reefs at the north end northward of the dry sand-bank is the safest. The two southern channels, although deep breaks in the reef, are difficult to enter without local knowledge.

Little Martinique, 745 feet high, lies about 3 miles eastward of the north point of Carriacou, and one-third of a mile north of it is Little St. Vincent, 275 feet high. Off the south-west side of Little Martinique are the islets Little Tobago and Fota, the former 200 and the latter 80 feet high. On the north-west side of Little St. Vincent are two sand-banks 3 feet above water, lying respectively at a long half mile and mile distance; from the easternmost a reef, uncovered, sweeps round the whole eastern side of the islands. At 2 cables S.S.W. $\frac{3}{4}$ W. from Little Tobago is a rock, with $1\frac{1}{2}$ fathoms water on it, and S. by W., three-quarters of a mile from the western sand-bank, are some shoal patches with 2 fathoms over them.

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The channel between the Carriacou coast reefs and the islet of Little Tobago is ~~4 cables~~ wide; in using it from the south-east, keep one-third the breadth of the channel from the edge of the reef, and when Fota opens of the north-west part of Little Tobago a vessel will be to the westward of the $1\frac{1}{2}$ -fathom rock. Between the rock and the reef there are from 6 to 10 fathoms water, but the tides in this channel are very strong and it is not recommended. Fota channel, or that between Little Tobago and Fota, although narrow, is better than the former. A small reef above water extends rather more than a quarter of a cable north from Little Tobago.

Between Fota and Little Martinique is a passage carrying $3\frac{1}{2}$ fathoms water, but it is not so good as the Fota channel.

Caution.—As the tide sets fully 3 knots through the above channels, it is necessary in working through from the north-west that the tide should be setting to the south-east; and in standing to the southward do not approach too near the Carriacou reefs, as the sea runs heavily on them.

Anchorage.—At about half a mile off the north-west side of Little Martinique, protected by Little St. Vincent, the sand-banks, and reef surrounding these islands, there is most excellent anchorage in from 8 to 12 fathoms water, taking care to avoid the 2-fathoms shoals, S. by W. three-quarters of a mile from the west sand-bank.

Martinique Channel.—At 3 miles North of the north end of Carriacou is Frigate islet, 250 feet high, connected by a bank and reefs to Union island north of it; at $2\frac{1}{4}$ miles eastward of the islet is Prune island, 164 feet high, surrounded by a reef which extends a quarter of a mile from its south side. Between these islands and reefs and those of Carriacou and Little St. Vincent, is a clear channel carrying not less than 7 fathoms water, except on the 5-fathoms bank off the north-west end of Carriacou, and which is recommended in preference to the channels between Carriacou and Little Martinique.

Anchorage.—There is anchorage for small vessels close under the west side of Frigate islet, and large vessels will find temporary anchorage to the south-west of the islet.

Tides and Currents.—It is high water, full and change, at Carriacou at 3h. 0m., and the rise and fall seldom exceeds a foot, and often it is but a few inches. An extraordinary high tide may, however, rise 2 feet. At the southern part of the Grenadines, the stream turns at 6h. or nearly half-tide. The tides throughout the Grenadines act with or against the general indraught into the Caribbean sea; consequently the flood tide generally runs strong whilst the ebb is often weak. The flood stream will sometimes run through the narrow channels full 4 miles an hour, while the ebb seldom runs more than 3, and often not more than one mile an hour. The average strength of the tides, however, in the channels, is about 2 miles, and in particular places 3 miles an hour. In proportion as the flood stream is accelerated by the equatorial current, so will the ebb or tide setting eastward be retarded. The ebb will always be felt inshore first, slowly sweeping round the points, whilst the flood is running in the middle of the channels. See also page 11.

Union island, 1,010 feet above the sea, is nearly three miles in length east and west, and 2 miles in extreme breadth. It lies $3\frac{1}{4}$ miles

north of Carriacou, and is the southern and most western of those under the government of St. Vincent, and produces a small quantity of corn and cotton. The population was 477 in 1861. The island is more or less skirted by reefs which connect it to Frigate islet, distant about two-thirds of a mile on the south, and Red islet, 140 feet high, close to it on the east, whilst at about a third of a mile from its north side is a small sand cay.

Chatham bay, on the west side of the island, affords fair anchorage for large vessels in 17 fathoms water, sand; but care should be taken not to go far into the bay, as there is a small shoal with 6 feet water on it, at about a quarter of a mile from the shore, and a little inside the depth of 10 fathoms. Small vessels may anchor farther in on the north side of the bay. There are no dangers in entering the bay, which should be from the northward on the port tack. Give the north-west point of the island a berth of about $1\frac{1}{2}$ cables and pass close to a remarkable small islet, 52 feet high, at the north point of the bay, and when abreast it, with good way on, shorten sail and the vessel will shoot into the anchorage.

Temporary anchorage may be had to the south-west of Frigate islet, in 8 fathoms water, if wishing to communicate with the villages on the south-east side of the island, but it is not recommended for any stay. Small vessels may go close to Frigate islet into 2 or 3 fathoms. Clifton cove, at the east end of the island, is a secure smooth anchorage for small vessels close to the north-east of a large house. The channel into it is close to the reef which protects the anchorage.

Supplies.—In Chatham bay fish can be procured with the seine in great abundance. Firewood is plentiful, but no water. The inhabitants are entirely dependent on what is collected in tanks during the rainy season.

Prune island, about half a mile in length and 164 feet high, lies one mile east of Union island. Nearly midway between them, or rather more than half a mile west of the south-west end of Prune island, is a shoal nearly awash, with channels of 4 fathoms water on either side of it, that may be taken by small vessels, but not recommended for general use.

Prune island is nearly surrounded by reefs, and on the north side they extend off nearly half a mile. The navigable channel between the north-west end of the reefs and those extending from Union island is less than a quarter of a mile wide, with from 4 to 13 fathoms water. The route through from the northward is mid-channel, and westward of the shoal nearly awash west of the south-west end of Prune island.

Mayero island.—The next group northward of Union island consists of Mayero island, the Catholic islet and rocks, and Tobago cays and reefs. Mayero island, 347 feet high, is the largest, about $1\frac{1}{2}$ miles

in length N.N.E. and S.S.W., nearly a mile in extreme breadth, and contains about 260 inhabitants, who live by fishing and raising a few vegetables. Catholic islet and rocks are about one mile north-west of Mayero island; the islet is 166 feet, and the rocks at about a quarter of a mile to the south-west of it, 77 feet high; the passage between them has 6 fathoms water, and may be taken with a fair wind in cases of necessity.

At 2 cables north-west of the north Catholic rocks is a shoal with $3\frac{1}{2}$ fathoms water on it, which must be avoided by vessels of large draught. A rock 8 feet above water and a small sand cay, called the Dry shingle, are connected to the islet on the east side at the distance of a quarter of a mile by a bank which encircles it. Between Mayero island and the Dry shingle is a good channel nearly 3 cables in width and with 5 fathoms water, for vessels from the northward for Mayero anchorage.

Anchorage.—Good anchorage in 6 or 7 fathoms water may be had on a bank extending about three-quarters of a mile westward from Mayero island. The best and most roomy berth for leaving with any wind is near the edge of the bank with the middle of the island bearing E.N.E., but as the trade wind is almost always between N.E. and S.E., a vessel may anchor much closer in out of the swell, taking care, however, to avoid a 3-foot shoal at $1\frac{1}{2}$ cables off the middle point of the island. The north-west point of Cannouan island well open of the north-west point of Mayero leads to the westward of the shoal; the two points in line lead on it.

In working for this anchorage, keep on the parallel of Mayero, and do not open the channel between it and Union island unless the tide is setting to the northward.

On the east side of Mayero island is a secure anchorage for small vessels in from 6 to 9 fathoms water, under cover of the extensive reefs which surround this side of the island. The passage in is from the southward between the reefs on the east and those skirting the shore of the island.

Tobago cays.*—At $1\frac{1}{4}$ miles eastward of Mayero island, are four small islets called Tobago cays. They extend over a space of about three-quarters of a mile; three of them are nearly in line north and south, the two northernmost being the largest, and the middle one 150 feet high; the fourth islet is east of the middle one. They are within a semicircular reef, just awash, named the Horse-shoe, the extremes of which are nearly $2\frac{1}{2}$ miles north and south of each other. There are two small sand-banks about 2 feet above water rising from the reefs at about a third of a mile south-west and south-east of the islets. The space between these cays and Mayero island is also filled with reefs having narrow channels between them.

* See plan :—Tobago cays anchorages, on Admiralty chart, No. 2,872.

Good anchorage for small vessels, in smooth water, will be found under the lee of the cays and between them and the Horse-shoe reef, the latter forming a perfect breakwater. The route to the anchorage is from the northward between Baline reef at the north-west end of the Horse-shoe and Mayero island, borrowing on the latter to avoid a rock with 6 feet water on it, lying S.S.W. $2\frac{1}{2}$ cables from the Baline reef. Small vessels may pass between Baline reef and the north-west end of the Horse-shoe. A vessel may leave the anchorage by the channels to the southward, but a sailing vessel cannot well get to it by them.

Worlds End reef.—The most eastern danger belonging to the group of the Tobago cays and reefs is the Worlds end reef, which lies in an E.S.E. direction, and its eastern extreme distant nearly $2\frac{1}{2}$ miles from the highest of the islets. It is $1\frac{1}{3}$ miles in length N.W. and S.E., about three-quarters of a mile in breadth, and dangerous for sailing vessels to be near in light winds, as the current sets strong over it. It has probably received its name from the fishermen having a long pull to reach it from the cays.

Egg reef and Sandy cay.—Close to the westward of Worlds end is Egg reef, separated by a narrow passage, and westward of the latter is Sandy cay with a tree on it, encompassed by a reef above water, with channels on either side of it. The cay is 6 feet high and the tree 20. These channels are narrow, deep, and may be taken in case of necessity. There is anchorage sheltered from the north under the lee of Egg reef. Vessels should, however, avoid the vicinity of the whole of these reefs eastward of Tobago cays, as the tides are strong.

Sail rock is a small islet or rock 203 feet high, rising from the south-east end of a small bank with 9 fathoms water over it, immediately within the 20-fathoms line of soundings. It is $3\frac{1}{4}$ miles eastward of the Worlds end reef, clear of danger, and bottom will be found on the edge of the great bank at the distance of 5 miles eastward.

The widest and best channel to the westward when near and southward of the Sail rock, is between the reefs bordering Little St. Vincent and Prune island north of them; or, if more convenient, a vessel may pass southward of the Worlds end reef, and between Union island and the Mayero group. But if a more northerly course is preferred, the channel between the latter group and Cannouan island may be taken. In pursuing this latter route a vessel should pass about 4 cables northward of the Channel rock, which lies in mid-channel, is somewhat flat, and 8 feet above water.

Half a mile S.W. of the Channel rock is a shoal awash, with deep water on either side of it, but the passage north of the Channel rock is wide and clear, and should be taken. The flood tide runs through these

channels at from 2 to $2\frac{1}{2}$ miles an hour, and the ebb to the eastward at from one to $1\frac{1}{2}$ miles.

Cannouan island, $2\frac{1}{2}$ miles northward of Tobago reef, is of an irregular outline, $3\frac{1}{4}$ miles in length north and south, and its northern part $1\frac{1}{2}$ miles in breadth, where it rises to a peak 853 feet above the sea, but the middle part is not so high, or in one place more than a quarter of a mile across; the southern part projects westward and forms on that side Charlestown bay, where there is anchorage. The island is more or less bordered by reefs, and on the south-east and south sides they extend off to about half a mile.

Both the north-west and south-west points of the island are bold and may be passed at the distance of a cable; but it is not advisable to go so near the north-west point in a sailing vessel, as the peak checks the wind and causes flaws and eddies, but this will not occur near the south-west point. The island is mostly owned by J. S. Snaggs, Esq., who resides here, and in addition to the cultivation of cotton and corn, rears cattle and sheep. The population is about 500. A large vessel should anchor in Charlestown bay in 17 fathoms water, sand, with the north points in line N. $\frac{3}{4}$ E., and the south-west point S.W. $\frac{1}{2}$ W. Small vessels may anchor close in shore. Within the 15-fathoms line of soundings the water shoals suddenly.

To the northward of Friendship point, the south-east extreme of the island, there is secure anchorage for small vessels inside a sandy cay and the reef. It should be approached from the south-west with smooth water. If the wind be fresh, a vessel should not attempt to pass Friendship point, as it fronts the channel formed by an open space in the reef east of it, or to enter by this channel; and as this anchorage could only be resorted to on any particular occasion, a person with local knowledge should be obtained. Anchorage will also be found westward of Dove cays.

About two-thirds of a mile W.N.W. of the north-west point of Cannouan island is a small bank with $6\frac{1}{2}$ fathoms water on it. Vessels of large draught should avoid it, as with the heavy swell, and the doubt which always exists as to whether the shallowest water is absolutely known, it will be more prudent.

Petit Cannouan is $3\frac{3}{4}$ miles northward of Cannouan. It is 3 cables long, 2 wide, and rises 222 feet high, with 10 to 16 fathoms water around it. Between it and Cannouan there are from 17 to 23 fathoms and no danger.

Savan islets form a group of small islets and rocks extending north and south over the space of a mile. The largest islet is about

3 cables long, one wide, 133 feet high, and being covered with grass has a bright green appearance when seen in the sun.* Savan rock, 105 feet high, is remarkable for having whitish sides and somewhat the appearance of the Sail rock, but from its being the southern of this group it cannot be mistaken for the isolated Sail rock. These islets and rocks are more or less skirted by reefs, and rise from a bank having from 4 to 10 fathoms water on it. Temporary anchorage will be found for small vessels north-west of the largest islet, but there is always a swell. The channel between this group and Petit Cannouan is about $3\frac{1}{2}$ miles in breadth, and clear of danger.

Petit Mustique.—At $1\frac{3}{4}$ miles N.N.E. of the Savan group is Petit Mustique, 340 feet high, and about half a mile in length N.W. and S.E.; a rock uncovered lies one cable off the south point of the islet, and another rock one foot above water, 4 cables south-westward of its west end, leaving a narrow channel between the latter and the island. The Petit Coy, 75 feet high, and surrounded by a reef, lies at about a quarter of a mile off the north extreme of the islet. The water is shoal for about $1\frac{1}{2}$ cables north of it.

Mustique island.†—At one mile north of Petit Mustique is the larger island of that name, $2\frac{1}{2}$ miles in length, one in breadth, and at its south end 495 feet high. The channel separating them has 7 fathoms water, and is clear of danger with the exception of the reefs extending $1\frac{1}{2}$ cables from Petit Coy and the south-west end of Mustique; as also the $1\frac{1}{2}$ -fathom shoal, on which the sea breaks, lying east distant half a mile from the south end of the island.

In anchoring in Grand bay, on the west side of the island, a vessel should pass west and northward of the Montezuma shoal, and enter between it and the north point of the bay, or make short tacks in the south part of the bay. The Montezuma shoal is about $1\frac{3}{4}$ cables in diameter, with only 3 feet water on it, and lies half a mile from the north extreme of Grand bay, or the middle point of the island. This shoal is extremely dangerous, as when the water is smooth it does not break, and cannot be seen until too late to avoid it. A vessel may also anchor north of the shoal off Cheltenham.

The east side of the island is skirted by reef, and off it is Rabbit islet with the Brooks, 60 feet high, and other rocks; but as there is no anchorage a vessel should avoid this side of the island.

* H.M.S. *Dido* anchored off Savan islets in November 1884 in 15 fathoms, and found a heavy swell and confused sea, but effected a landing on Savan rock for prize-firing at a target. The current set W.N.W. 3 miles per hour.—Remark Book, Navigating Lieut. G. L. B. Bennett.

† There are cattle and sheep on Mustique island, but if fresh beef is required, notice is required by the manager to catch and kill the animals.—Remark Book, Navigating Lieut., H.M.S. *Fantome*, 1886.

Pillory islets and rocks.—Close off the north end of Mustique is Double rock, 20 feet high, and at one-third of a mile farther is Single rock, 15 feet high; the channel between the rocks has from 7 to 8 fathoms water. The Pillories are three islets in a W.S.W. and E.N.E. direction, over a space of about two-thirds of a mile. They are from three-quarters to a mile north of Mustique; the western islet is 65 feet high, the middle 85 feet, and the easternmost and largest 190 feet. Between these islets and Single rock is a narrow passage carrying $3\frac{1}{2}$ fathoms water. The above channels may be taken by small vessels from east to west, but only in cases of urgent necessity.

A group of rocks partly uncovered, and the largest 70 feet high, lies E.N.E. of the great Pillory; they are named the Pillory rocks; and between them and the islets there is a clear channel one-third of a mile wide, with 8 and 9 fathoms water; but there is a sunken rock with 8 feet of water on it, and which generally breaks, S.E. by E. $\frac{1}{2}$ E. distant two thirds of a mile from the great Pillory; and at only half a mile from the great Pillory in the same line is another rock awash, and always to be seen. It will be prudent to give these rocks a berth.

All-awash islet.—Nearly $1\frac{1}{4}$ miles E. $\frac{3}{4}$ N. from the Pillory rocks is the prominent islet or rock called All-awash, 223 feet high, steep-to, and which can be passed on either side. A vessel can work to windward here with the assistance of the ebb tide.

Baliceaux island,* $1\frac{1}{4}$ miles in length, a quarter to half a mile in breadth, and 430 feet high, is $1\frac{1}{8}$ miles north of All-awash. A 5-fathoms bank extends off its western side, on the edge of which with caution a vessel may anchor, but the water is never smooth, although there is no danger for vessels of small draught. There are two shallow patches close in on the north-west, and a reef uncovered on the south-west side of the island. The landing is not very good. A few deer exist on the island, but none are to be found on any other of this group.

At the north end of the island is Cactus cay, 63 feet high, and at a quarter of a mile north of it is Black rock, 41 feet high, with a 2-fathoms shoal between.

Battowia island.—Less than half a mile north-west of Baliceaux is the bold-looking cliffy island of Battowia, 680 feet above the sea, with the Bullet, an isolated lump 318 feet high, close to its north end, shaped somewhat like a conical bullet, which cannot be mistaken. To the

* H.M.S. *Dido* anchored here in March 1884, and Navigating Lieut. G. L. B. Bennett remarks:—The anchorage in 7 fathoms is fairly good, with the S.W. extreme S. 62° E. and the N.W. point N. 12° E. From this position the top of a house (the only one on the island) will be seen over the shoulder of a hill. The landing is beneath this house and just to the right of a grave with iron railings round it; but the landing is bad on account of the surf. The island abounds with rabbits, wild goats, and deer.

north-west of the Bullet, distant $1\frac{1}{2}$ cables, is a breaker, but so near the land that it could scarcely be touched, unless by a vessel keeping unreasonably close. It was to this island that most of the Caribs were sent when captured in the St. Vincent war, before their final deportation to Rattan and Honduras. Between the islands of Baliceaux and Battowia is Church cay and reef. The narrow channels carrying 2 fathoms water on either side of it, are fit only for small vessels with a fair wind.

Tides and Currents.—The edge of the bank is about 4 miles eastward of the two latter islands, and continues its northern direction for about 10 miles north of Battowia island; it then trends in the direction and passes close to Bequia without joining the St. Vincent bank. The space between the two banks is, however, narrow, and not over 300 fathoms deep. In this channel the current and tide almost always sets to the westward near the middle, but the ebb tide makes to the eastward in a less depth than 70 fathoms.

At 6h., full and change, the ebb stream begins to run to the eastward, and advantage may be taken of it to work to windward during its continuance under the lee of Bequia, on the St. Vincent shore, and between Bequia and the weather islets or cays; but a vessel will have little chance of making easting when the flood and current are setting westward. When the ebb stream sets to windward along the shore of Bequia island against a strong trade wind, a heavy confused sea will be found in this channel.

Bequia island, the most important and largest of the Grenadines, under the government of St. Vincent, is 880 feet high, $6\frac{3}{4}$ miles in length, in a general N.E. and S.W. direction, and from one to $1\frac{1}{2}$ miles wide in the middle, verging with an irregular coast line and several bays to a point at both ends. It lies 6 miles southward of St. Vincent, and 5 miles to the north-west of Baliceaux. The population is about 900, who do not undertake any kind of work, but are content to loll about the beaches, or sleep in their little thatched huts from one week to another; their extreme want of energy, and their existence, so far as aliment is concerned, is a complete mystery to a European. A magistrate and a clergyman of the established church reside here, whose district includes all the neighbouring islets and cays.

Admiralty bay,* on the western side of Bequia island, is about two-thirds of a mile deep, and in the inner part near the head, which is narrowed by shallows on either side, a vessel would be well sheltered from all winds except the S.W., and when blowing from this direction,

* See Admiralty plan :—Admiralty bay, with views, No. 503; scale, $m=20$ inches.

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which is an exceedingly rare occurrence, would, in a measure, be protected from the sea, as it would be broken in passing over the Belmont shallow, and the two banks projecting from the north side of the bay. The inner part of the bay is not of much extent, but deep enough for any vessel, and the channel to it between Belmont shallow, bordering the shore of the bay on the south and the opposite bank, is clear, distinct, and traceable from its darker colour and deeper appearance.

This part of the bay could only be entered by a large vessel under steam or by warping; the water is quite smooth, and small vessels work in. The leading mark between the banks through the deep-water channel is the principal house about the middle of the head of the bay, (not easily seen on account of the trees,) in line with the notch on the hill, bearing N.E. by E. $\frac{1}{2}$ E., or the inside cay off the west extreme of the island half shut in by the point north-east of it, W. by S. $\frac{3}{4}$ S.; but the colour of the water and the eye is the best guide; the water over Belmont shallow appears mottled from the weeds and rocks. A vessel, in ordinary circumstances, with the trade wind blowing, intending to stay here only a few hours, may close the beach and make fast to one of the large trees. So smooth and deep is the head of this bay that a vessel may heave down here in great security to the sandy beach.

Navigating Lieutenant Robertson, H.M.S. *Jason*, 1864, remarks that the channel leading to this anchorage being narrow, and the discoloured water of the shoals not being seen till close to, great care is required.

There is also anchorage for small vessels in the middle sandy bay called Tony Gibbons, in $3\frac{1}{2}$ or 4 fathoms water, at quarter of a mile from the beach. A vessel of light draught may approach in any direction from the westward.

The Wash rock lies at about half a cable off the north point of Rocky bay, at a third of a mile southward of the north-west point of the island. To clear it keep the town of Kingstown, or mount St. Andrew, in the island of St. Vincent, open of the north-west point of Bequia, bearing N. by E. A vessel of large draught from the northward, after passing the Wash rock, should not haul up too much to avoid the 3-fathoms bank extending south-east from Fort point, the north extreme of the bay, until the leading mark is on, or she may anchor in 15 or 16 fathoms water in the outer part of the bay. All the banks in this bay, with less than 5 fathoms on them, assist the pilotage by the light-coloured water.

Supplies.—Bequia has no running streams, and there is no watering place in Admiralty bay. There are some wells at the head of the bay, but the water is not very good. Wood is plentiful, and may be obtained by permission from the owners of the estates, but it is doubtful if the

natives would cut it. Poultry may be had occasionally in small quantities, and sometimes fish, but no vegetables.

Quatre isle and cays.—Quatre isle, with a population of 37 people, $1\frac{1}{8}$ miles south of Bequia, is 460 feet high, $1\frac{1}{2}$ miles in length, narrow, with an indentation on the north-west, and one or two projecting points on the east and south, forming little bays. There are three cays between it and Bequia, and Pigeon islet, 220 feet high, lies a third of a mile off its west end. These islets and cays, with the south part of Bequia projecting westward, enclose a large space, with moderately smooth and everywhere deep water, forming an open but safe anchorage at any time, excepting the hurricane season; even then, with steam power, it is as safe as any other place, and there is no difficulty in leaving it at all times.

There are four channels formed by these islets and cays, which may be taken either way by vessels with steam power, but under sail should only be used from east to west with a commanding breeze, as the currents are strong. As a general rule pass in the middle of each channel, except between Quatre and Petit Nevis (325 feet high), where borrow a little on the former to avoid a shoal off the south-west end of Petit Nevis, on which the sea generally breaks. But as little can be gained either in distance or position by taking either of these small channels, neither of them should be used unless in cases of necessity.

Friendship bay, a circular indentation, about a third of a mile across on the south-east side of Bequia, offers good shelter for small vessels of 10 feet draught. It is formed by St. Elair point on the east, and by the cay, 71 feet high, of the same name, and connected to the main by a reef, on the west; the route in is midway between the two. Here the American whaling schooners often lie to watch.

Between this group and that to the eastward, the depth of water is uniform, being about 20 fathoms, the only danger being the Montezuma shoal, close to Mustique island.

TIDES and CURRENT.—The usual or six hours tide is observed throughout the Grenadines, but it is much influenced by local causes, and in consequence irregular. The establishment or high water at full and change is at about 3h., whilst the first set of the flood tide or stream to the westward is at 12h. This is what may be expected in the open channels, where the water is not impeded, but the regularity which would otherwise take place is quite deranged by the general indraught which at times entirely overcomes the ebb stream.

As a general rule, the flood or tide setting westward is apparently longer and of more force than the ebb which sets eastward; but its direction is changed by every wind, or rather by the inclination of the

trades, which do not, however, diverge much from east, yet have much influence on the tide. The ebb begins inshore first, where it runs the longest, whilst the flood and current combined is first felt in mid-channel, and when strong sometimes runs all day. If desirous of getting to windward, keep close to the islands, taking advantage of the tide, where it may be found favourable, and often setting eastward when it is running strong to the westward in the channel.

In working to the northward from the Grenadines, with the trade wind at N.E., it would be as well to try the Bequia side first, before stretching across.. The rise of the tide is not generally more than one foot, and it will be an extraordinary rise to reach two. Where the ebb stream sets round the points against the trade wind a heavy confused sea generally occurs; this is more particularly the case at the north-west point of Cannouan island.

ST. VINCENT.*

This island was discovered by Columbus on the 22nd day of January 1498, being St. Vincent's day in the Spanish calendar, from which it takes its name. With the exception of one short interval, from 1779 to 1783, it has been in possession of Great Britain since 1763. The island is oval-shaped, about 13 miles in length, north and south, 8 miles in extreme breadth, and contains an area of about 100 square miles. Its surface is irregular, and a chain of lofty ridges from north to south divides the island in the centre. The most remarkable is the Soufrière, a volcanic mountain about 3,000 feet high, at the north-west end of the island, near Tarratee point, which may be seen about 55 miles. It rises abruptly from the shore in this quarter, but its north-east face slopes gradually, and forms an extensive and highly-cultivated plain.

A tremendous eruption of the Soufrière took place on the 30th April 1812, which had been tranquil since 1718. The crater is half a mile in diameter and 500 feet deep. From the central range of hills several others diverge on either side to the sea, forming numerous valleys which are well watered by a number of streams running down them. The soil in the lower parts of the valleys is rich and loamy, while on the higher ground it is more sandy and not so fertile. The shores are generally bold and rocky, intersected, however, by sandy bays, off which droghers find temporary anchorage for the purpose of shipping the produce of the neighbourhood to Kingstown, the capital of the island.

The island is free from noxious exhalations, and the climate, though exceedingly moist, is considered to surpass in salubrity that of any other of the West India islands. The extent of cultivated land in 1855 was

* See Admiralty Chart, No. 791, St. Vincent; scale, $m = 1.0$ inch.

21,081 acres, and the principal productions are sugar, rum, cocoa, molasses, cotton, flour, arrowroot, and an important mineral cement formed from volcanic ashes, called *pozzuolana*. The population in 1884 was 33,656. The value of imports in 1884 116,774*l.*, and the exports 122,626*l.*

KINGSTOWN BAY,* the principal anchorage, is at the south-west end of St. Vincent. It is nearly three-quarters of a mile deep, and formed by Battery or Old woman point on the north-west, and Cane garden point, distant a long mile, to the south-east. The water is deep all over the bay, and there are 18 to 20 fathoms about a quarter of a mile from the town. Fort Charlotte with the barracks, hospital, and the flagstaff on Old woman point being 637 feet high, give it a most commanding appearance. A small ledge above water, named the Gimblets, extends from Johnson point, immediately north-west of it.

The town, which has a pleasing appearance, stretches along the head of the bay, close to the water, the principal object being the church with its cupola and gilt ball, and in its rear the mountains gradually rise in a semi-circle. About a mile from the town is the botanic garden, ascending from a level to a steep hill with a mountain stream forming its northern boundary. Near the upper part of the garden and in its centre, stands the governor's house, commanding a beautiful view, with Kingstown below it, and in front the deep blue sea and Grenadines.

Water, at a moderate cost, may be conveniently obtained from a pipe on the pier.

Directions.—Kingstown bay is generally entered from the southward. Having closed with the south point of St. Vincent, which slopes gradually, steer along the land at the distance of about three-quarters of a mile, when Young and Duvernette islets on the north-west side of Calliaqua bay, and the high land over Kingstown will be seen, and shortly the high bluff of Battery or Old woman point will come open. Duvernette, the outermost of the two islets, is a small round sugar-loaf islet, 204 feet high, covered with vegetation and having an old fort on its top. Pass this islet about half a mile off and haul in for Cane garden point, the south-east extreme of Kingstown bay, which slopes gently towards the sea.

If bound into the bay in a sailing vessel, haul close round Cane garden point, but take care not to be taken aback, and look out for the lofty sails, as the wind is often scant and unsteady and the squalls from the high land are heavy. A vessel may stand over to the western shore without fear, and having tacked, the best anchorage is in 10 fathoms water, dark sand

* See Admiralty plan :—Kingstown, Greathead, and Calliaqua bays, No. 501 ; scale, $m = 5.0$ inches.

and good holding ground, with the church bearing North, about a quarter of a mile from the shore. If more convenient, a berth will be found farther out in 15 fathoms, with the church about N. $\frac{1}{2}$ E., and Old woman point W. $\frac{3}{4}$ N.

As the wind during the middle of the day frequently rushes down the valleys with great violence, be prepared to give the vessel a good scope of cable or she may drift off the bank. At night the breeze generally falls light, a weather current sets round the bay, and should the anchorage be crowded, it may be necessary to steady her with another anchor. Off the pier there is a mooring buoy for the mail steamer.*

Tides.—It [is] high water, full and change, in Kingstown bay, at 3h. 0m., springs rise about $1\frac{1}{2}$ feet, neaps one foot.

LIGHT.—A *fixed* white light, 640 feet above the sea, visible† 6 miles, is shown from fort Charlotte.

Calliaqua bay, about 2 miles south-eastward of Cane garden point, was formerly much frequented by merchant vessels, but now Kingstown is the principal shipping place. It will be known by Young and Duvernette islets, on the west side, and in the interior, some distance above the village, in a commanding position, is the vigia or look-out. The bay has a convenient sandy beach for shipping cargo. Two rivulets run into it, and the anchorage is secure. The village is small. A pilot is necessary.

Lagoon.—On the east side of this bay is a snug little harbour protected by the reefs, called the Lagoon, with 6 to 9 fathoms water, mud bottom, but the entrance through the reef from the south-west carries only 2 fathoms.

Layout or Rutland bay.—About 3 miles to the north-west of Old woman point is Layout bay, with 20 to 25 fathoms water at a cable from the shore. The south-east point is steep-to, and this side of the bay is sandy; the north-west side is rocky, and a small reef extends from the point.

Princes or Barrawally bay lies about $5\frac{1}{2}$ miles to the north-west of Kingstown. Its north side is formed by some remarkable rocks, called the Bottle and Glass, which are clear of danger, and have a boat

* St. Vincent and the neighbouring islands were visited on the 9th September 1875 by a heavy south-west gale, accompanied by a very unusual deluge of rain; 19 inches falling in 12 hours. Of the 10 vessels anchored in Kingstown bay, 7 were driven ashore.

† This light has been visible as much as 20 to 23 miles distant, as noticed by several of H.M. ships—notably H.M.S. *Bellerophon*, 1876, and H.M.S. *Tourmaline*, 1878.—Navigating Officers Remark Books. This is probably owing to some peculiarity of the atmosphere at the time, though it has been imputed to the kerosine oil used in the lamps.

channel within them. If coming from the northward, haul close round these rocks and anchor in 20 fathoms water, sandy bottom, with the rocks bearing N.W., and the barracks N.E. by E. $\frac{1}{2}$ E. The bottom on the north side of the bay is foul. The wind is so variable and unsteady under the high land, that if intending to remain any time it will be better to warp in, and drop a second anchor to the eastward in about 12 fathoms. If coming from the southward, the shore may be kept aboard equally close, and the vessel may probably shoot far enough in to drop the inner anchor first. The water being deep so close in, the anchorage is only fit for small vessels.

Water may be obtained from a stream at the head of the bay.

Caution.—To navigate under the lee of high land, is generally extremely tedious and uncertain. A vessel may be becalmed for hours, or indeed days, when the trade wind is light. When it is strong, precaution is necessary, and the mariner should be prepared for the sudden gusts which rush with violence down the valleys. As the anchorages generally lie close to the shore, and the banks extend but little off and steep-to, if taken aback there may be some danger of getting on the rocks; the boats should therefore be ready to tow. Anchors must not alone be depended upon.

Anse Morluse or Winns bay.—The points of this bay bear about N. by W. and S. by E. from each other, with soundings across from 10 to 12 fathoms about a cable from the shore. The north point is foul.

Boccamaw bay is noted for the stream of excellent water which flows into it. It lies N.N.W. and S.S.E., with a depth of 26 fathoms across, within half a cable of the shore; a vessel may anchor at that distance off shore, a little to the northward of the river, in 17 fathoms water.

Chateau Belair bay.—From the Bottle and Glass rocks, the shore runs N. by E. $\frac{1}{2}$ E. to a bluff called Cumberland point, the north-west extreme of St. Vincent; it is all along bold and a vessel may stand in to half a mile from the shore. Between are several small bays; Chateau Belair, the largest, and about 13 miles from Kingstown, affords anchorage about 2 cables off its eastern shore in 13 or 14 fathoms water, with the north point of the bay bearing N. $\frac{1}{4}$ E.

In the middle of the bay there is no bottom with 50 fathoms, nor on the west side with 30 fathoms, half a cable from the shore. The landing is not good, and with northerly winds a heavy surf rolls in on the beach. Chateau Belair is separated from the little bay southward of it by Wood islet, which is about a quarter of a mile in length, lying in a

north-westerly direction. Between the islet and the point is a narrow passago carrying $6\frac{1}{2}$ fathoms water, which is used by boats and sometimes by droghers.

The view of the Soufrière from this bay is magnificent, ascending as it does in an inclined plane from the north-west point of the St. Vincent, covered with verdure, and interspersed with rich-looking estates.*

Wollamaboo (or Wollabou) village is about $1\frac{1}{2}$ miles north of Chateau Belair, off which anchorage will be found in 17 fathoms three-quarters of a cable off shore with Wood island just open; this is the anchorage recommended for visiting the Soufrière, the landing is indifferent, but canoes can be hired that land passengers safely.

The eastern shore of the island is free of outlying dangers, and is generally steep-to, but does not possess any secure anchorage.

Route to Barbados.—The passage from St. Vincent to Barbados, in a sailing vessel, is best made by working to windward between St. Vincent and Bequia, and when able to weather the Grenadines, stretch to the southward for about 12 hours, and in 3 tacks Barbados will generally be reached. The passage, at times, is performed in 36 hours. *See* Tides and Currents, p. 35.

ST. LUCIA.

This island was discovered on the day of that saint, in 1502, and after various and frequent changes came finally into the hands of the English in 1803; the language generally spoken, however, is still French. The island is nearly oblong in shape, about 25 miles in length N.N.E. and S.S.W., independent of a curious narrow high ridge of land 3 miles long, which forms a peninsula at its south-east end; and its breadth is about 7 miles at the north end, and 15 miles at the south; with an area of about 300 square miles. It is mountainous and broken throughout its whole extent, with the exception of a small plain at the south-east end and the volcanic peaks rise to a great height, the most remarkable and elevated of which, called the Soufrière, is at the south-west end of the island, and visible about 55 miles.

The mouth of the crater is on an eminence between two peaks and appears at first view like a limekiln, and the vapour which issues from it may be seen at some distance. Near the base of this mountain two most remarkable conical rocky peaks, thickly wooded to their summits, rise perpendicularly out of the sea to a height of between 3,000 and 4,000 feet, and are called from their appearance Pitons, or sugar-loaves, the northern

* Mr. T. W. Sullivan, Master, H.M.S. *Vestal*, 1856.

one being the more remarkable ; they lie nearly north and south of each other $1\frac{1}{2}$ miles apart, and the southern one forms the south-west point of the island. The island is covered with forest trees of every size and of endless variety, amongst which are valuable materials for building, and some excellent specimens of fancy wood. Mahogany grows in great profusion, and in dye woods there is the fustic and logwood, many tons of the latter being annually exported.

Numerous small rivulets descend from the rugged heights, but not of sufficient strength to force their way to the sea, and consequently spreading out on the low lands create great swamps and marshes, making them unhealthy. This Island produces cocoa, coffee, molasses, rum, sugar, and a small quantity of cotton. The population in 1881 was 40,532, of whom about 900 were white. The value of the imports in 1884 was 146,460*l.*, and of the exports 145,865*l.*

St. Lucia has only been partially examined, and no correct description can be given of its eastern shore, which is exposed to the full surge of the Atlantic, and does not appear to possess any secure anchorage. It is said to be free of danger with the exception of the Champigny bank, 2 miles in extent, about a mile from the shore and 3 miles to the southward of the north-east point of the island. This part of the island is only visited by droghers during crop time. On the western side are several safe and commodious bays and harbours, and we shall begin the description of these from the south end of the island at Vieux, or Old fort bay.

Vieux or Old Fort bay.—This capacious bay, and probably one of the finest in the Caribbean islands, is formed by the Moulacique peninsula, or narrow ridge of land before noticed at the south-east end of St. Lucia, and Caret islet, which bears from it N.W. distant two miles. It affords excellent anchorage with the prevailing winds ; an extensive bank with from $2\frac{1}{2}$ to 5 fathoms water on it extends in a south-westerly direction from Vieux fort beach, and there is a dangerous coral bank about a mile from the shore. A vessel having rounded the point within a cable's length, may haul into the bay and anchor in 8 fathoms water, with the conspicuous church of the village bearing N. by E. $\frac{1}{4}$ E., and western extreme of the island N.W. by W. $\frac{3}{4}$ W., very good holding ground.

Water may be obtained from a small river which runs into the north side of the bay, but in the dry season the boats will have to proceed half a mile up before it is sufficiently good. On the north-east side of the bay, about 50 yards from the shore, and nearly abreast the river, is a small rocky ledge, nearly awash and steep-to. This bay is also famous for its turtle, which at times, and in the proper season, may be had in large numbers. Fish, such as the barracouta, jack, kingfish, and small fry may

also be obtained. Nearly all the fruits of the West Indies are to be had here.

Laborie.—About three miles W.N.W. from Vieux fort is the little bay and village of Laborie. The shore is skirted at a short distance by a reef, within which, east of the village and close inshore, there is shelter for coasters; but there is no anchorage for large vessels.*

Ballenbouche is situated 3 miles to the westward of Laborie, about midway between Moulacique point and the Great Piton. Off this place a reef, which does not always break, extends out upwards of a mile, leaving between it and the shore a boat channel in moderate weather. In running down or beating up, the reef will be avoided by keeping the Great Piton just open of the land to the eastward of it; the water shoals rapidly on nearing the reef, but the lead is a safe guide, either by day or by night.

Anchorage.—At a short distance to the westward of Ballenbouche is the river Dorée, off which there is anchorage in 5 or 6 fathoms water, good holding ground, sand, nearly half a mile from the shore, with the Little Piton open eastward of the Great Piton, bearing about N. by W., and Dorée church N.E. $\frac{1}{2}$ E., but it is exposed to the prevailing trade winds. In the dry season the river is scarcely seen from seaward, being then narrowed at the mouth to a few yards, but during rains it rushes down with force, and overflows the banks. The landing here is not good. A little farther on there is also anchoring ground in 7 fathoms off the village of Choiseul, about a quarter of a mile from the shore, abreast the church that stands on the beach.

Water and Wood may be obtained at Choiseul in case of need, and vessels bound to windward, being unable to stem the current, will find the above anchorages convenient stopping places. Between Choiseul and the Ballenbouche reef there is no danger.

Soufrière bay.—At the south-west end of St. Lucia, immediately to the northward of the Little Piton (1,100 feet above the sea), the shore bends round, forming a bay about 2 miles deep, sheltered from S.S.W. round by east, to W.N.W.; the shore all around, however, is so bold, that there are 30 fathoms water at less than a cable from the beach, and 3 fathoms only 10 yards from it; it therefore possesses no convenient anchorage; still it is visited by merchant vessels, which load here moored stern on to the shore.

* The description from Vieux fort to Marigot harbour, is from the journals of Mr. C. R. Maclean, published in the *Nautical Magazine*, vol. xxvi.

The town of Soufrière is next in importance to Castries, and may contain about 1,800 inhabitants.

Directions.—In entering Soufrière bay the wind must be guarded against, as it rushes off from the valleys with such force as to endanger the spars; therefore, before entering, sail should be reduced, and if the breeze outside is strong, a reef taken in. When beating in, the wind will be found more steady on the south side than on the north.

Having approached to within a short distance of the town, a strong hawser should be sent to the shore and made fast to one of the trees on the beach in front of it, and another hawser coiled in a boat ready to leave the ship and bend on, if required. The moment the end of the hawser is on board, all sail must be quickly furled, for should it part it would be useless to drop the anchor, as it would immediately drag into deep water.

It will be necessary to hang the vessel by the stern by a stream chain from either quarter, and drop a bower anchor on the edge of the bank, in case the wind should veer to the westward; this, however, never takes place except in the hurricane months, and at all other times the sea is perfectly smooth.

Roseau bay is about 8 miles to the northward of Soufrière, and between them is la Raye bay. Both are of the same character as Soufrière bay; the former has 15 fathoms within a cable of the beach, and the latter 10 fathoms at the same distance. The coast is all along bold and in places rises vertically from the sea.

Water and Wood may be obtained at la Raye bay, where there is a small village.

Marigot harbour* is a most remarkable little creek leading into a deep basin, capable of holding two or three vessels of large draught, besides half a dozen smaller ones, quite secure even against hurricanes; the neighbourhood, however, is considered one of the most unhealthy spots in the Windward islands.

Grand Cul-de-sac bay,* about 2 miles northward of Roseau, affords good anchorage. The river Cul-de-sac falls into the northeast side of the bay, but in the dry season the mouth is nearly choked up, and a stagnant lagoon is formed just within it; the stream, however, flows continually, and some distance up, where free of vegetable matter, the water is fit for use. There is a landing pier in this bay and an extensive sugar manufactory on the beach, near the pier, which makes a conspicuous object from seaward.

* See Admiralty plan :—Marigot harbour to Gros island, No. 197; scale, $m=3$ inches, with plans.

PORT CASTRIES* lies about 9 miles from the north point of St. Lucia, and is one of the safest harbours in the West Indies, even in the hurricane season. It is about a mile in length E.S.E. and W.N.W., but its breadth between the shoals varies from $1\frac{1}{2}$ to 2 cables, and as the wind blows directly out, it is consequently too narrow for a vessel to work in. Its shores in the inner part are so bold and convenient that vessels of the largest draught may be hove down alongside them without much difficulty. At the head of the port or inlet on the south shore is the town of Castries, the capital of the island. Good supplies may be obtained here. Port Castries is a coal dépôt for the mail steamers.

LIGHTS.—From the 15th June 1885 the following lights will be exhibited at port Castries: a fixed white light from an octagonal tower, painted with black and white stripes, on the summit of Vigie, north side of port Castries, visible 6 miles, and a light (named Tapion light), elevated 80 feet above the sea, from the Tapion rock on the south side of the entrance. Also when mail steamers are expected, a *fixed green* light is shown from the outer edge of the Cocoa-nut shoal, on the south side of the harbour, and a *red* light from that of the Vieille ville shoal on the opposite side.

Directions.—When bound to port Castries from the northward, which is the best route, having passed Gros islet, the entrance may be easily recognized by the high bold bluff, 295 feet high, which forms the north point, having on its summit a small fort and signal tower with a signal station from which a mid-day gun is fired, and the lighthouse, which is the most conspicuous object, but the narrow entrance will not be seen until nearly abreast it. This point, named Vigie, is steep-to, therefore haul sharp round it within half a cable's length, and anchor as close under the north shore as can be conveniently done for weighing.

Coming from the southward, the position of the port is as readily pointed out by the barracks on the Morne and the government house in a clump of trees just below the barracks. Tapion rock is low, with a small fort on it; a shoal extends for nearly $2\frac{1}{4}$ cables in a W.N.W. direction from the rock, having 4 fathoms at its outer extreme, and 16 feet at the distance of one cable. The north-west point of St. Lucia open of a dark bluff point south of it, leads westward of this shoal in 7 fathoms water, and the battery within Tapion rock well open clears to the northward.†

* See Admiralty plan:—Port Castries, No. 499; scale, $m=15\cdot0$ inches. Great improvements are projected in port Castries. The 9-feet patch is to be removed, pier from market-place extended, and the bank off it deepened to 21 feet. The south part of the bank opposite the market-place to be removed. Remark book (N.) Lieut. Henry Savile, H.M.S. *Griffon*, in 1884. In November 1886, the harbour works in progress had so far advanced that a ship drawing $19\frac{1}{2}$ feet could secure alongside the coal wharf.—Report by the Captain of H.M.S. *Comus*.

* T. W. Sullivan, Master, H.M.S. *Vestal*, 1856.

In general, during the middle of the day, the wind rushes down the port with great violence; every preparation should therefore be made to give a good scope of cable in bringing up, to prevent dragging, and it will perhaps be found more safe and convenient not to commence warping in until the breezes slackens, which is usually the case from towards evening to about 10 o'clock the following morning.

In warping, be careful to keep in mid-channel, for shallow rocky flats extend off most of the points; but the water is here so clear that with the sun unclouded they are readily seen and avoided. The south-west edge of the Vieille ville shoal on the north side of the harbour, the outer edge of the Cocoa-nut shoal on the south side, as also the south edge of the central shoal, together with the northern and western edges of the harbour shoal off the town, are marked by perches which are red on the starboard hand and white on the port. Nearly midway between point Bananes and the central shoal there are two mooring buoys for the mail steamers.

Anse du Choc is a bight about 3 miles in length, between port Castries and Brelotte point, in which a vessel may anchor in 6 or 8 fathoms water, to the westward of a small islet, which lies not far off shore near the centre of the bay. About half a mile to the north-east of the islet there is a large rivulet.

In approaching this bay be careful to avoid a rocky shoal nearly a mile long and two cables broad, running parallel to and distant from the shore half a mile, its north end being about a mile to the southward of Brelotte point, the north extreme of the bay. The south end of the shoal lies about W. by N. from the rivulet. To avoid it, keep Gros islet open of Brelotte point.

Gros Islet bay* is about 4 miles N.N.E. of port Castries, and being more easy of access, is the general anchorage for vessels of war intending to make only a short stay. It is formed between Gros or Pigeon island on the north, and Fourreur or Barrel of beef, a small round islet on the south, which lie S.W. by S. and N.E. by N. from each other, distant $1\frac{1}{2}$ miles, and measured from this line the bay is about a mile deep.

Pigeon island is high, bold, and steep-to, 4 cables in length north-east and south-west, and half that distance in breadth, and on its summit there is a small fort, and at the east end the barracks; it lies at about half a mile from the shore, with a channel between for small coasters. Fourreur isle is a small low rocky islet, lying about a quarter of a mile from the shore, the channel between being safe for small vessels. There is a village on the eastern shore, and a watering place on the southern side of the bay.

* See Admiralty plan:—No. 197; scale, $m=3$ inches.

Directions.—As there is no danger in entering Gros islet bay, both points may be rounded within a cable. A vessel will most probably have to beat in, and the best anchorage will be found with the west end of Pigeon island bearing N.W. by N., and Fourreur isle S.W. $\frac{1}{2}$ W. in 6 fathoms water, clear sandy bottom. Take care not to shoot within this, for the bank which borders the bay is steep-to, and a quarter of a mile from the shore there is as little as 2 fathoms water.

A vessel bound to port Castries from Barbados had better pass round the north end of the island, and in shaping the course make a large allowance for a lee or westerly current, which generally prevails. By this route she will avoid the violent squalls and baffling winds on the west side of the island.

A bank of soundings from 10 to 27 fathoms has lately (1884) been discovered by the French cruizer *La Florie* off the N.E. of St. Lucia, between $14^{\circ} 3'$ and $14^{\circ} 14'$ N. lat. and $60^{\circ} 36'$ and $60^{\circ} 47'$ W. longitude.

Current.—Around St. Lucia the current runs generally with great strength to the W.N.W. and N.W., more particularly in the passage between this island and St. Vincent.* Within 2 or 3 miles of its south and west sides, however, there is often a strong eddy which will assist a vessel in beating to windward. The native fishermen say there are periodical changes in the currents, that observe great regularity, and of which they avail themselves always going out when the current sets to windward.

In the channels between the windward islands, the prevailing set of the current is to the west, tending to north-west. The strength varies, but much increases in the vicinity of the shores of the islands, when it may attain a rate of 3 knots.†

* In 1878 H.M.S. *Tourmaline*, when off the south-west end of St. Lucia only just held her own against the current when she was steaming six knots.—Remark Book, Captain Boxer, 1878.

† On April 21–2, 1886, H.M.S. *Fantome* found a current running 4 knots per hour, from off the south-west of Martinique, to near “Antigua;” it carried her on her course, N. 15° W., 55 miles in $13\frac{1}{2}$ hours.—Navigating Officer's Remark Book, H.M.S. *Fantome*.

CHAPTER II.

THE LEEWARD LESSER ANTILLES ; MARTINIQUE TO
BARBUDA INCLUSIVE.

VARIATION in 1887.

Martinique	-	0° 45' W.		Antigua	-	-	1° 25' W.
Guadeloupe	-	1° 0' W.		Barbuda	-	-	1° 40' W.

MARTINIQUE.

This island, discovered by Columbus in 1493, is a French possession, and was first settled by them in 1635. It is 35 miles in length N.W. by N. and S.E. by S. between cape St. Martin on the north-west and Salines point on the south-east, but varies in breadth, and its area is about 380 square miles. At its north-west end it is about 8 miles across ; from cape Solomon near its south-west end to the eastern shore, it is about 16 miles ; but near the centre of the island, between the head of the bay of Fort de France and that of François, the distance is scarcely 7 miles.*

This island is very lofty and irregular in height, and may be readily distinguished by three remarkable mountains of different forms, rising far above the general chain which runs through the whole of the island from N.W. to S.E., and may be seen about 45 miles off. The most northern of these is mount Pelée, 4,428 feet above the sea, rising nearly 4 miles to the south-east of cape St. Martin, and its summit, when seen from a distance, appears rounded, and presents nothing remarkable. The Pitons du Carbet, which rise $3\frac{1}{2}$ miles from the western shore at about one-third from the north-west end of the island, between the bays of St. Pierre and Fort de France, are a group of conical peaks, with very steep and abrupt declivities, the most elevated being 3,960 feet high ; but their summits being generally in the clouds, are seldom visible. At the south-east end of the island the Vauclin mountain rises to the height of 1,657 feet, and has the appearance of a flattened cone. It rises at the east end of a chain of hills, which are divided towards the south into two branches, one terminating at Salines point, and the other uniting itself with the steep ridges that command the bays of Fort de France on the north, and Grande anse du Diamant on the south.

* See Admiralty chart :—Martinique island, No. 371 ; scale, $m = 0.9$ inch. The directions for this island are taken almost entirely from the Manuel de la Navigation dans la Mer des Antilles, deuxième partie, 1875, by Captain Ch. P. de Kerhallet, and from M. Monnier, Ing. Hyd.

The year at Martinique is divided into two distinct but unequal seasons; the dry season, so called, commences in November and ends in July; and the wet season includes August, September, and October. The latter months are remarkable for frequent changes in the atmosphere, and by the rains, which are much more abundant than in the former season; the winds are then changeable and squally, and at times hurricanes and earthquakes have shaken the whole island.*

The dry season does not accord with the name which it bears; for, in fact, the quantity of water which falls at Martinique during this part of the year is much more considerable than that which falls in Europe during the same lapse of time. These rains are not of long duration, but are of frequent occurrence. The wet or wintry season generally commences three days before the new or the full of the moon at the close of October. This fact is established by observation for many years, as well as that the principal changes of the weather almost always come on about the new and full moons.

The produce of Martinique is much the same as that of the other Windward islands. The whole population in 1881 amounted to 165,000, including 13,200 Indians, 500 Chinese, and 6,500 Africans. The number of French vessels that entered inwards was 361, carrying 190,150 tons, besides 649 foreign vessels; and the number of French vessels cleared outwards was 375, and 637 foreign vessels. The total value of the imports amounted to 1,401,370*l.*, and of the exports to 1,473,720*l.*

The north-east and west shores of Martinique are clear, bold, and steep-to, from the Sugar-loaf rock on the north-west side of Trinité bay, round to Fort de France, and from Ramiers islet at the south side of entrance to Fort de France, south-east to Grande anse du Diamant; but the south, south-east, and east shores are irregular, deeply indented, and dangerous, particularly the latter, which is skirted by low islets and reefs, extending about $2\frac{1}{2}$ miles from the coast, and should be very carefully approached.

Le Diamant or Diamond rock lies S.E. about a mile from the morne du Diamant, which forms the south-west point of Martinique, with a clear channel between, named the Fours. The rock is very remarkable, nearly square in form, each side about 2 cables long, and rises almost perpendicularly to the height of 574 feet above the sea. It is inaccessible except at a small spot on the west side, where landing may be effected under favourable circumstances. The south and west sides of the rock are steep-to, but to the northward a small bank, of $5\frac{1}{4}$ and 6 fathoms, extends to the distance of a quarter of a mile, and a cable to the

* The hurricane of the month of October, 1817, left, for many years after, vestiges of its dreadful ravages.—*Monnier Desc. Nautique*, page 91.

eastward there is as little as 4 fathoms water. At three-quarters of a mile E.S.E. from the rock, there is also a small detached coral bank with $4\frac{1}{2}$ fathoms water on it. Morne du Diamant rises abruptly from the shore to the height of 1,568 feet, and may generally be seen at a great distance; it is bold and steep-to.

Martinique possesses but one secure harbour for vessels of large draught, named Fort de France, on the north side of which is the capital of the island. There are, however, several good anchorages, which will be described in order, commencing from the south end of the island round westerly.

Cul-de-sac Marin,* about 3 miles to the north-west of Salines point, is a small inlet, nearly 2 miles deep, but very irregular in breadth, and the anchorage in it is so enclosed by shoals, and so narrow at the entrance, that vessels of large draught must either steam, warp, or tow in, which cannot be done without the assistance of a pilot. Small vessels may, however, work in without much difficulty, as the water is so clear that the numerous rocks and sand-banks can be easily seen and avoided. To the westward of Marin, the east point of entrance to the inlet, the channel is divided into two parts by the Singe bank (which has only 3 feet water on it), and becomes not more than a cable wide. The passage to the south and east of the bank will be found the easiest to navigate.

The following buoys and beacons have been placed to facilitate the navigation of this inlet.

Two iron conical buoys lying respectively S. 62° W. and S. 61° W., $8\frac{1}{3}$ and $5\frac{1}{2}$ cables from Marin point; one on the extreme S.E. edge of the Singe shoal; and two to mark the inner shoals, South and S. 10° W. from the middle of the village, at 271 and 330 yards respectively from the shore.

A beacon on point Marin and another near point Cayot, these two beacons in line leads through the channel south of Singe shoal.

A beacon with a triangle on the Milieu bank and another beacon on the bank to the west of the Milieu bank on the opposite side of the channel.

The chimney of the factory at the town is a conspicuous object.

Anchorage.—The best anchorage for vessels of large draught will be found with Marin point bearing S.W., and the Piton Crève-cœur, 663 feet high, E. by S. $\frac{1}{2}$ S., in 12 fathoms water, good holding ground. The anchorage farther in under the town is only fit for droghers.

Small vessels bound to windward, finding the current too strong, will find temporary anchorage outside the inlet, on the bank to the westward of the town of St. Anne; or off the river Pilote, $1\frac{1}{2}$ miles north-west of the inlet, and south-east of the town of St. Lucie, passing eastward of the

* See Admiralty plan No. 494:—Cul-de-sac Marin; scale, $m = 2\frac{1}{2}$ inches.

cay of the same name, which is awash and surrounded by reefs. There is also anchorage at anse des Trois-rivières : anse du Céron ; du Marigot, and the Grande anse du Diamant, avoiding the Olbian reef with 6 feet water on it, more than half a mile from the shore on the east side of the latter.

Petite anse du Diamant and Grande and Petite anse d'Arlet are 3 small bays, between morne du Diamant and the bold headland forming north side of Grande anse d'Arlet, named cape Solomon ; there is good anchorage in either of these bays about a quarter of a mile from the shore, in from 7 to 10 fathoms water, white sand. The two latter are separated by a bold point named Bourgos.

Supplies.—At the east end of the northern beach, in the Grande anse d'Arlet, there is a small spring of excellent water ; wood, poultry, and vegetables may be obtained from the village.

In 1877 the population of d'Arlet was 2,328.

Directions.—Vessels coming from the south or south-east, and bound to either of the anchorages just described, will first make the Vauclin mountain, which will be a guide to point Salines, the south end of the island. This point is very low, and reefs extend about three-quarters of a mile off it ; about half a mile to the south-east is the small low islet of Cabrit.

Shoal ground extends S.W. nearly half a mile from Cabrit islet, and having rounded it, if bound to cul-de-sac Marin, the shore should not be approached within a mile. The bank of soundings is so steep, that by day the eye will greatly assist the lead, the discoloured water being easily seen from aloft. Having passed Dunkerque point, large vessels should approach Borgnesse, the west point of entrance to cul-de-sac Marin, carefully, to avoid the shoal ground off St. Anne, and anchor about a quarter of a mile south-west of the latter point, if under sail, and be ready to warp or tow in, as the breeze slackens towards the evening.*

If bound to the westward, having passed Cabrit islet, a W. by N. $\frac{1}{2}$ N. course for $10\frac{1}{2}$ miles, will lead to abreast the Diamond rock, when hug the shore close aboard, and choose an anchorage as before directed. It is necessary, however, to observe, that when under the lee of the high lands, preparation must be made to meet the sudden and violent gusts which rush down the gorges of the mountains, and which are the more dangerous as they come upon a vessel when she is probably becalmed and quite unmanageable. A vessel may pass between the Diamond rock and the coast, but no real advantage will be gained.

FORT DE FRANCE BAY† lies between cape Solomon, the bold headland which forms the north side of Grande anse d'Arlet, and

* See note on page 47 and plan No. 494 Cul-de-sac Marin.

† See Admiralty plan :—Fort de France bay, No. 494 ; scale, $m = 2\frac{1}{4}$ inches.

Nègres or Negro point, $5\frac{1}{2}$ miles north of it; its width, however, may be more properly confined to the space between Ramiers islet and the above point, $3\frac{1}{2}$ miles distant, and from this line it extends eastward about 5 miles. The bottom is irregular, and varies considerably in depth, but its shores are so indented as to afford several secure anchorages against all winds. The passages to them, however, are intricate, and the assistance of a pilot is necessary.

Pilots can be obtained at Fort de France, as also at St. Pierre for the east coast of Martinique.

The town of Fort de France on the northern side of the bay, about a mile eastward of Negro point, is built on a low level plain, bounded on the west side by the river Madame, on the banks of which the chimney of the large steam sugar manufactory are very conspicuous, on the east by the carénage, and on the north by a canal, which forms a communication between them. The residence of the Governor is at Fort de France, but for a part of the year he resides at Belle Vue, on the north shore of the bay, where the national flag is hoisted during his residence; there is a landing at a small pier at the foot of the cliffs beneath the residence. The anchorage for vessels of war lies off the town, and is protected by fort St. Louis on a narrow peninsula, which rises abruptly from the sea to a considerable height, and separates the anchorage from the carénage eastward of it. A bank of gravel and rock extends about half a mile to the south and south-west of the peninsula, its edges being marked by two square black buoys, with beacons elevated about 14 feet, carrying a sphere and a revolving plate with the word "Stop" written on the buoys about 3 cables from the south point of the fort, in $4\frac{1}{2}$ and 5 fathoms water.

There is a wreck S.S.W. of fort St. Louis on the shoal, near which a boat buoy is moored. The wreck is above water.

The best anchorage will be found with the flagstaff on the fort bearing N.E. $\frac{3}{4}$ E. and Negro point from N.W. to W. by N. Small vessels may proceed further in towards the town, according to their draught. This anchorage is secure from November to July; but during the hurricane season, vessels of war are secured in the bay of Trois islets.

Buoyage.—The system of buoyage adopted at Fort de France is that all black buoys are to be left on the port hand and* red buoys on the starboard hand on entering, and parti-coloured buoys are elbow buoys.

Passe des Trois islets.—The three shoals on the south side of Passe des Trois islets are each marked by a buoy; the buoy on the

* These red buoys have one white horizontal band a little below the top. Middle buoys are painted red and black in horizontal bands.—Paris A. H., 17 November 1885, No. 178.

westernmost shoal lies in 23 feet water at 3 cables North of Point du Bout. A buoy is moored in 26 feet water at 4 cables N.W. of Pointe la Rose. The north side of Passe des Trois islets is marked by three buoys; the westernmost lies in 23 feet water, the middle and easternmost buoys in 28 feet; the entrance to Cohé du Lamentin lies between these two buoys.

Cohé du Lamentin.—A buoy lies in 16 feet water, near the edge of the shoal on the east side of Cohé du Lamentin, a short distance within the entrance. At 4 cables N.N.E. of this buoy, another buoy is moored in 32 feet water, and marks the west extreme of this shoal.

Anchorage north and east of Gros islet.—A buoy is moored in 29 feet near the west extreme of the bank extending N.W. from Gros islet. A buoy is moored in 19 feet water, on the east edge of the shoal situated 3 cables N.N.W. from Gros islet. On the south edge of a shoal at $3\frac{1}{2}$ cables N.N.W. from the above shoal a buoy is moored in 26 feet. Two buoys mark the east and west extremes of a shoal situated 4 cables north-east of Gros islet; the western buoy lies in 26 feet, and the eastern in 32 feet. A buoy is moored in 26 feet on the extremity of a shoal which extends in a north-west direction from an islet situated 8 cables east of Gros islet.

Supplies.—All necessary supplies are to be had at Fort de France. Water of an excellent quality may be obtained at a fountain in the carénage, and two boats can water at the same time, or water tanks may be had. It can also be procured from a watering place near the river Madame, where it is brought to the shore by means of pipes, and with a hose the casks may be filled in the boat.

Dock.—The graving dock at the head of the carénage has extreme surface length 120 feet; at water line, 410 feet; surface breadth, ; length over all, 394 feet; breadth of entrance, 85 feet 4 inches; and depth over sill, 28 feet 10 inches.

The Government dockyard contains excellent workshops for repairs, and a spacious sail loft.

LIGHTS.—On Negro point is a red mast, from which is shown, 62 feet above the sea, a *fixed* white light, and should be visible 11 miles. A *fixed red* light to seaward or from E.S.E. to S.W., but white on the land side, is also exhibited from the south part of fort St. Louis, 131 feet above the sea, and visible 3 miles. Both of these lights are very indistinct, and are not visible so far off as stated.

A red light is shown from the southern mole in carénage.

A red light is also shown from the boats' landing-place west of fort St. Louis. This is said to be very distinct.

An electric light when mail steamer is due is shown from the Transatlantic Co.'s wharf in the carénage. Lights are occasionally shown from the buoys on the spit off fort St. Louis.

Banc du Mitan is a small rocky patch lying on the south side of the general anchorage in Fort de France bay. It has only 4 fathoms water on it, and lies with the flagstaff of fort St. Louis bearing N.E. by N., and Negro point N.W. It is marked by a conical *red* and *black* buoy in horizontal stripes, in 29 feet.

Banc du Gros islet is a shoal lying still farther to the southward, and nearly midway between Ramiers islet and Negro point; the least water on it is 20 feet. Between this bank and the shore to the southward, the bottom is uneven and rocky, the depth varying from $4\frac{1}{2}$ to 11 fathoms; it shows itself by the light colour of the water, and is named the White bank. It is marked by a beacon buoy, painted black and red in bands, moored in the middle of the bank; the beacon is about 14 feet high, and carries a sphere and revolving plate.

Banc de la Vierge is a rocky knoll, about 2 cables in extent, with a depth of 9 fathoms, and should be avoided in coming to an anchor. When on the knoll the flagstaff of fort St. Louis bears E. by N. $\frac{3}{4}$ N., and Negro point N.N.W. $\frac{1}{2}$ W.

Directions.—During the day and in fine weather the entrance to Fort de France is easy of access, particularly to vessels whose draught of water will admit of passing over the bank of Gros islet, which will be known by the red buoy on its middle. Having rounded cape Solomon, which is steep-to, Fort de France bay will come open, and a vessel may haul to the wind accordingly. Should the wind be to the southward of East care must be taken to avoid the above bank, the edge of which may be distinctly traced by the discoloured water; and having passed it, do not steer for the anchorage until the flagstaff of fort St. Louis bears N.E. $\frac{1}{2}$ N. to avoid the Mitan bank. Should the wind be to the northward of East, which is generally the case, she will have to work in, and in so doing she can stand boldly in to the north shore, and to the south-east according to her draught, or until the flagstaff of fort St. Louis bears N.E. $\frac{1}{2}$ N., and anchor as before directed, in muddy bottom. If from the westward, Negro point may be rounded at the distance of 2 or 3 cables.

At night, when entering Fort de France bay from the westward, bring the red light at fort St. Louis to bear about E. by N. $\frac{1}{2}$ N., and open to the southward of the *white* light on Negro point, and steer for it; and when the latter light bears W.N.W. anchor in 14 or 15 fathoms water.

The tide is very weak in Fort de France bay; it is high water at full and change at 4h., and the rise is about one foot.

Carénage, lights, buoys, &c.—The channel to the carénage is marked on the west side of its entrance by the *black* buoy (before mentioned) about 3 cables S.S.E. of the south point of fort St. Louis, a *red* light is shown from this buoy when required; 4 buoys mark the east side of the channel, viz., a *red* nun with a white band at the north-west extreme of Grand Seche in 26 feet, a *red* and *white* nun at the south-west extreme of spit off river Monsieur, and *white* and *red* warping buoys on the north-west and south-west edges of the 2-fathom shoal; on these a light is shown when requisite. There are only* 19 feet water alongside the wharf, but when necessary, coal can be shipped by lighters. Coaling is done very expeditiously by the native women. Vessels going alongside the coal wharf should take a local pilot, more particularly to point out the system of mooring alongside.

Anse de Navire is a small bay $1\frac{1}{4}$ miles to the north-west of Negro point, in which there is good holding ground, in 8 or 9 fathoms of water, about a cable from the shore. Care must be taken to shoot gently into the bay under easy sail, for the bank is so steep that there is a depth of 36 fathoms about a cable farther out, over rocky bottom. The best berth will be found from abreast of the battery to abreast of the westernmost houses. There is a rivulet of excellent water at the village.

Anse de Case Pilote is a similar anchorage, $2\frac{3}{4}$ miles to the north-west of Navire bay; but it is seldom visited by large vessels.

Carbet village.— $1\frac{1}{2}$ miles southward from St. Pierre is the village of Carbet, built on the beach in a very picturesque position; it is recognised by a church with a very slender spire.

The coast, from point Negro to St. Pierre, is formed by cliffs, intersected by bays frequented by coasters.

ST. PIERRE ROAD† lies about 10 miles north-west of Negro point, and in this space the coast is bold, steep-to, and clear of danger. It may be said to lie between St. Marthe point on the south, and the river des Pères north of it. On the sandy shore is the town of St. Pierre, with a population of 38,323 in 1885, and the chief commercial dépôt of the island.

Pilots.—The pilotage is performed by two certificated pilots; their look-out is on Folie hill to the northward of the town. A pilot will be quickly on board any vessel making a signal for one, and his boat will make fast hawsers to the buoys if required. Pilots can be had here for the east coast of Martinique.

* Consular report dated 31st October 1885 gives this depth as about 24 feet.

† See Admiralty plan :—St. Pierre roadstead, No. 495; scale, $m = 10\cdot4$ inches.

The best anchorage for vessels of war is a little to the southward of St. Marthe point, in about 20 fathoms water, and 2 cables from the shore, for the bank extends farther out here, and is not so steep as abreast the town. Merchant vessels anchor off the town, about 2 cables from the shore, and it is necessary for them to moor; but the bank is so steep that they must be certain of soundings before letting go an anchor, and half a cable must be veered out before checking.

The anchorage is divided into four parts from St. Marthe to the river des Pères. Vessels of France anchor to the southward, and foreigners to the northward of Place Bertin, their anchors being dropped at $1\frac{1}{2}$ cables from the shore, and their sterns secured to anchors or bollards on the beach.

One and a half cables from the shore abreast the town and a cable apart are large square mooring buoys; the one for the English mail steamers is *black* and *white*, the one for the French *red*. One buoy (No. 5) is reserved for steamers calling only, and another one (No. 9) is reserved for vessels carrying chemicals, and is known as the American buoy. Vessels are only allowed to use hempen hawsers to these buoys. Chains are forbidden, and no vessel is allowed to remain longer than 6 hours at any buoy.

About a cable from the shore and W.N.W. of the marine hospital, is a rocky patch named cay de l'Hospital, $1\frac{1}{3}$ cables in length, with 7 to 15 fathoms water on it, which deepens suddenly on its west side to 28 and 33 fathoms. Vessels often moor on this bank in 8 or 10 fathoms. To the north of the bank the water is deep, and a quarter of a mile from the mouth of the river des Pères, there are 76 and 92 fathoms water.

Water.—Excellent water may be obtained from a fountain at the south end of the town of St. Pierre, at a good beach planted with trees, without removing the casks from the boat, and from a pipe at the end of the pier where the colonial steamers go.

LIGHTS.—A *fixed* white light is exhibited from a mast on the summit of St. Marthe point, visible in clear weather 5 miles. On the same point, westward of the former, is a *fixed* green light visible 5 miles. The *white* and *green* lights in line lead to the anchorage. A red fixed light, visible 9 miles, is exhibited at an elevation of 56 feet from a light-house in the south extremity of Place Bertin. Also a light* is shown from a buoy at the edge of the bank when the mail is expected, and for three nights after, if it does not arrive.

Le Precheur (The Preacher) is a village 4 or 5 miles north of St. Pierre, where small coasters moor. Some fresh provisions can be

* This light is reported as a remarkably bright light, visible 10 miles, like an electric light.—Navigating Offices Remark Books, H.M.S. *Flamingo* and *Griffon*, 1884.

obtained here ; there is a convalescent home in connexion with the hospital of St. Pierre.

Directions.—Vessels bound to St. Pierre road from the eastward, generally pass round the north end of Martinique, which is bold and steep-to, and presents no danger. In approaching the road from either the north or south, the shore must be kept close aboard. The current generally sets to the southward.

TRINITÉ BAY.*—The south and south-east sides of Martinique, as before-mentioned, are dangerous to approach, yet they possess several safe anchorages, readily accessible to steamers or small vessels with the assistance of a pilot. Trinité bay is the most northern of these, and being more easy of access, is frequented by vessels of large draught, and is quite safe during the ordinary winds. After St. Pierre and Fort de France it is the most important commercial port in the island. It lies about S.W. 6 miles from the Caravelle rock, and 14 miles south-eastward of Macouba point, the north extreme of the island.

The town of Trinité contained in 1877 a population of 7,805.

This bay is fronted on the north by a shallow rocky bank, on which there are several dangerous shoals, with channels between them, extending from point de Sucre to the end of the peninsula of Caravelle, (which forms the north-east point of the island,) a distance of more than 6 miles. This bank has very irregular depths on it, varying from one to 9 fathoms causing in general so high a sea, that vessels of large draught, coming from the northward, had better pass between its west end and point de Sucre instead of crossing it.

Water.—The best watering place in Trinité bay is under the house at Beau Séjour.

LIGHT.—On the summit of Caricoli hill, at the extremity of Caravelle peninsula, and a quarter of a mile inland, is a white tower, which exhibits, at 410 feet above the sea, a *fixed* white light, visible in clear weather about 12 miles.

Caravelle rock lies North $1\frac{3}{4}$ miles from the peninsula of Caravelle, is very remarkable, and an excellent guide for vessels bound to Trinité bay, or the anchorages on the east side of the island. It is quite barren, steep-to, and rises to the height of 95 feet, its summit terminating in a sharp point, completely blanched by the continued presence of birds ; when seen at a distance it appears like a vessel under sail.

Caravelle peninsula, projecting to the north-east, may be said to form the eastern side of Trinité bay. It is about 5 miles in

* See Admiralty plan :—Trinité bay, No. 494 ; scale, $m = 2\frac{1}{2}$ inches.

length, but its south side is so irregular that it varies in breadth from a half to 2 miles. At its inner end it separates the port of Trinité from the bay of Galion on the south-east, by a narrow isthmus of moderate elevation, on which may be seen the windmill and mansion of Beau Séjour. The land rises towards the east, and about the middle of the peninsula the hill of Tartane, on which there is a signal-post, rises to the height of 623 feet. The north side is composed of low reddish cliffs and sandy bays, skirted by a coral reef, on which the sea generally breaks, for from one to 3 cables from the shore.

St. Aubin isle.—The western side of Trinité bay terminates to the north at St. Aubin isle, $1\frac{1}{2}$ miles from Fort point at the west side of the entrance of the inner anchorage. This islet is high, steep on all sides, and its summit rounded and wooded, and lies three-quarters of a mile from the shore. Its north side is bold and steep-to, and may be approached freely; but to the E.S.E., foul ground extends for a quarter of a mile, and its south side is nearly connected to the shore by a coral bank in places nearly dry.

Loup-Ministre.—Near the centre of the entrance to Trinité bay, West of Diable point, and N.E. $\frac{3}{4}$ N. from Fort point, there is a small reef called Loup-Ministre,* with 6 to 10 feet water on it, on which the sea almost always breaks with much force, and is consequently useful as a guide to the bay. Between it and the shore of Caravelle there are many small coral shoals, making this passage from the eastward dangerous.

The Mitan bank is small, carries a depth of only 11 feet, and does not always break. It bears N.E. by N. from the fort, E.S.E. from the highest part of St. Aubin isle, and lies on a line between the fort and Loup-Ministre.

Loup St. Marie.—The west end of the main bank terminates $1\frac{1}{2}$ miles North of St. Aubin isle; but a little less than a mile W.N.W. of this, and a mile N.N.E. of the islet of St. Marie—situated in front of the village of that name, and connected to the shore by a narrow sandbank†—lies Loup St. Marie, a shoal 3 cables long, north and south, and 2 cables broad, with a depth of $5\frac{1}{4}$ fathoms on it; but with strong north-east winds it frequently breaks. There is a clear channel on either side of the shoal; the mill of Beau Séjour open a little to the eastward of St. Aubin isle, leads close to windward of it; and a little open to the westward, to leeward of it.

* The word *Loup* (wolf or seal) is used in Martinique to signify a shoal with little water on it.

† A reef is reported to skirt the shore southward of St. Marie islet, and to extend from the islet two-thirds of the distance across the bay.

St. Maria.—This place is readily distinguished by the chimneys of the sugar manufactory near the mouth of St. Maria river. Vessels anchor in 6 to 8 fathoms about half a mile off shore, but the anchorage is unprotected.

Directions.—Approaching Trinité bay from the northward keep well to windward and do not bring the Caravelle rock to bear northward of East, until the windmill of Beau Séjour comes nearly in line with St. Aubin isle, then haul up on the leading mark for the channel either to windward or leeward of Loup St. Marie, and when isle St. Marie bears W. $\frac{1}{2}$ S., shape a course to pass about half a mile to the eastward of St. Aubin isle.

Good outer anchorage will be found in 9 fathoms with Fort point bearing S.W. $\frac{1}{2}$ S., and the mill of Beau Séjour S.E. by E.; but if more convenient, proceed farther in, the eye being a sufficient guide, as the shoal ground on either side will be distinctly seen. Should the wind be to the southward of East a vessel will have to beat into the bay. In *all cases* great caution must be observed in approaching the Loup-Ministre, should it not break.

It is generally more difficult for a vessel to leave the port with the prevailing wind than to enter. In this case, endeavour to keep the eastern edge of the bank, which shows itself, close aboard, until she can fetch clear of the reef which extends E.N.E. 2 cables from Fort point; she may then stand boldly towards the reefs, which are visible for the greater part of their extent; great care, however, must be taken to avoid the Mitan bank.

Pilots for this bay and adjacent anchorages are generally to be found in the offing.

Caracoli channel is formed between Caracoli point, the south-east end of the peninsula of Caravelle, and the north end of the coral bank which extends hence to the southward about $2\frac{1}{2}$ miles from the shore along the whole of this side of the island. There are several small channels through it, but the Caracoli is by far the best for vessels bound to any of the anchorages within it.

Caracoli point is a remarkable, bare, steep, rocky headland 95 feet above the sea, the land slopes from the heights above, and at its foot a flat bank of coral extends for about a cable. The north end of the main bank bears from it S.S.E. one mile; nearly midway between, however, lies a small coral bank, with $5\frac{1}{2}$ fathoms water, causing a heavy roll of the sea, and should be avoided by bordering towards the point; it may be generally distinguished by the discoloured water.

Galion bay, on the south side of the peninsula of Caravelle, is 4 miles wide at the entrance between Caracoli point and Ramville islet

south of it, which is about 328 feet high, and has a bushy and rounded summit, but the bay becomes contracted towards its inner end, and between Brunet point and Banane point, it is not more than a mile in breadth. Within Caracoli point is the cul-de-sac de la Tartane, but it is choked with reefs, and of no importance. The western shore is much indented, and forms several bays, which, however, are skirted and obstructed by numerous coral shoals, and a heavy swell sets in. The river Galion, with its sugar manufactory about half a mile within its mouth, empties itself into the bay to the south-west of a remarkable conical wooded islet of the same name. The only safe anchorage against all winds is on the north side of the bay, under the west side of Brunet point, which lies $2\frac{1}{2}$ miles to the south-west of Caracoli point, nearly South of the semaphore on Tartane hill, and is steep-to and bold.

Directions.—Having entered the Caracoli channel, in running down the south side of the peninsula of Caravelle, the shore should not be approached within half a mile until Brunet point bears N.W. by N., when haul in and anchor as convenient, about a quarter of a mile from the eastern shore, with the point bearing S.E. by E., and a large house north of it N.N.E., in $4\frac{1}{2}$ fathoms water. In leaving this anchorage a sailing vessel will have to beat out, and care must be taken to avoid the two small banks Loup-Banane and Loup-Charpentier, which lie without the reefs which skirt the whole of the south side of the bay; the former has 9 feet water on it, and lies South 6 cables from Brunet point, and E. by S. $\frac{1}{2}$ S. from Galion islet; the latter is nearly $1\frac{1}{4}$ miles S.S.E. from the same point, East of Banane point, and has 13 feet on it. To the eastward of these shoals, the bay is free of danger till nearing the inner side of the main bank, on which immediately in front of the bay, and nearly 3 miles S. by E. $\frac{1}{2}$ E. from Caracoli point, there is a dry spot called Loup-Bordelais.

Havre du Robert, at its entrance between Grotte rock and Chardons islet, is not more than about $4\frac{1}{2}$ cables in breadth, but becomes much wider within. The former, situated on the north side, is steep-to, and is connected with a bank of coral and gravel (barely covered by the sea) to a small islet of the same name, which is also united in a similar manner to Ramville islet at the south point of Galion bay. The south side of the channel is bounded by reefs nearly dry, which extend off in every direction from Rose point, and from which rise the two small islets named Rose and Chardon. The edge of the reef is nearly a cable from the latter, and is steep-to.

The harbour is large, safe, and commodious, for the swell is here broken by the outer reefs in front of it. It is very irregular in shape, but affords

in several places good security for small vessels, and good holding ground everywhere in from 7 to 9 fathoms, sand and mud. The town is situated at the north-west part of the harbour. On the west side of the islet Petite Martinique, which lies off the middle of the northern shore, there is a cove sufficiently secure for careening. The rise of tide is about 5 feet, but it depends on the force of the trade winds.

Directions.—Having entered within the main bank by the Caracoli channel, there is no difficulty in making or entering the havre du Robert, for the reefs are nearly dry, and readily distinguished by the discoloured water. It is not, however, so easy to beat out of, being very narrow, and the eye must be the chief guide. Having passed outside the islets, a course may be shaped either for the Caracoli or the Mitan channel to the south-east.

Mitan channel lies nearly midway between Mitan cay on the north, and Thiery isle $2\frac{1}{4}$ miles south of it. The former is a small low cay on the inner edge of the reef, it lies East $2\frac{1}{4}$ miles from Rose point, and S. by E. $\frac{1}{2}$ E. 6 miles from Caracoli point; about a mile N. by W. $\frac{1}{2}$ W. from it is the Loup-Garou, a similar small cay.

Thiery isle is the easternmost of a group of small islets lying about $1\frac{1}{2}$ miles from the nearest shore. It is about 100 feet high and its summit has the appearance of a rounded cap covered with brush wood; $1\frac{1}{2}$ miles E.S.E. of it, and on the outer reef is a dry, flat, rocky ledge, called Pinsonnelle cay, which forms the south-east danger of the Mitan channel.

Directions.—With the wind at N.E. or even E.N.E., and moderate weather, vessels bound out from either Galion bay or havre du Robert, will find the Mitan channel preferable to the Caracoli. In general the sea is much smoother to the southward of Mitan than at any other part of the reef. Leaving the former, care must be taken to avoid the Loup-Marseillais, which is a narrow ledge, with 10 feet water on it, lying about half a mile W. by N. from Loup-Garou; it generally breaks. Leaving havre du Robert, the semaphore on mount Tartane open of Ramville islet leads eastward of the reefs which extend off Chardon isle and Rose point, and having brought Mitan cay to bear N. by E. about a mile, haul to the wind through the channel. The semaphore of Tartane on with Mitan cay leads just outside, and to windward of the reefs on the south-east side of the island.

François anchorage, $2\frac{1}{4}$ miles southward of Rose point, is a bay about three-quarters of a mile deep, with excellent holding ground; completely sheltered from all winds by the land and dry reefs, through the latter there are two narrow intricate channels, which are so extremely

difficult to navigate, that none but steamers or small vessels can get out of them. Sugar manufactories are established at the towns of François and Aubin.

Culs-de-sac Fregate, Simon, Sans-souci, and Vauclin, are small inlets, in which vessels of light draught will find good anchorage, but they are all equally difficult to navigate without the assistance of a pilot. In front of these inlets, however, there are several small openings or passes in the reef, which might be used in case of great emergency by those well acquainted with the locality.

Pinsonelle pass, the first to the southward of Mitau, is formed between Pinsonelle* cay and the Sans-souci cays southward of it. To run through, bring the Vauclin mountain on a S.W. by W. bearing, upon which line there will not be a less depth than $4\frac{1}{2}$ fathoms.

Brigot pass is about $2\frac{1}{2}$ miles to the southward of the above, and E. by N. $\frac{1}{2}$ N. from the church in the village of Vauclin, but it is narrow, and too dangerous for any vessel to attempt without the assistance of a pilot.

Vauclin pass, $1\frac{1}{2}$ miles farther southward, is somewhat larger and less intricate, but still only available for small coasters. To enter from the southward bring the little hill on Vauclin point to bear N.W. $\frac{3}{4}$ N., which course will lead through between the reefs, which are only a cable apart towards the inner end of the channel. The depth varies from 7 to 8 fathoms.

Vauclin point is the extremity of a fork of the great mountain of that name, which separates the cul-de-sac Vauclin from those of Grenade and Sans-souci to the northward of it. The ridge slopes uniformly but rapidly, terminating at a small steep hill on the shore, 216 feet above the sea. The main bank and outer reefs may be said to end at the Vauclin pass, but the coast continues to be skirted by inner ones nearly a mile and a half off the coast, which incline gradually to the shore, and extend about half a mile at Cabrit islet, which is the south point of Martinique.

TIDES and CURRENT.—The time of high water at Martinique depends greatly on the strength of the trade wind, but in general, at full and change, it is at 4h. From the same influence the rise and fall at havre du Robert is about 5 feet, while at Fort de France bay it is only about one foot. The stream is entirely influenced by the great equinoctial

* On Pinsonelle cay, is the wreck of an American ship, which forms a seamount for this bank.—Paris N.H. 33, 1883.

current, consequently, near Salines point on the south, and the Perle rock on the north-west side of the island, the stream runs generally to the westward. On the east side with the wind at N.E., it runs to the S.W., and with S.E. winds to the N.W., and sometimes at the rate of 3 knots. On the west side, however, close in shore, there is scarcely any stream at all, and after a prevalence of light winds it is sometimes found running strong to the N.E. and East.

In the channel between Martinique and St. Lucia the current is frequently imperceptible; for soundings in this channel off N.E. end of St. Lucia, *see* page 46.

ST. ESPRIT REEF.

This danger was first reported by a French ship of that name bound from Marseilles to Martinique in 1817; and again by H.M.S. *North Star* in 1833, and it was said to be in lat. $14^{\circ} 40' N.$, and long. $59^{\circ} 38' W.$ In consequence of the apparently clear account of soundings having been obtained in this position by the latter vessel, a most minute examination of the immediate neighbourhood was made in January 1834, by no less than six vessels of war, but no trace whatever was found of either shoal or soundings. In 1866, however, soundings from 40 to 80 fathoms over a bank about 18 miles to the westward of the above position, and extending N.W. and S.E. for about 10 miles, were obtained by H.M.S. *Buzzard*, and which were verified by H.M.S. *Wolverene* in the same year. This bank was searched for without success by H.M.S. *Gannet* in 1866-67, by H.M.S. *Jason* in 1869, and also by H.M.S. *Sirius* in 1872. St. Esprit reef is marked on Admiralty charts as E.D. (existence doubtful).

DOMINICA.

This island* was discovered by Columbus on Sunday, the 3rd day of November 1493, and received its name in consequence. It has been in possession of Great Britain since 1783. The island is somewhat oblong in shape, 27 miles in length N.N.W. and S.S.E.; its extreme breadth is 13 miles, its extreme northern end being a little over 2 miles, and the southern portion 6 miles in breadth, and it contains an area of about 290 square miles. It is of volcanic origin, with lofty rugged mountains running through the centre of the island from north to south, the highest of which, Diablotin, 9 miles from the northern point, is 4,747 feet above the sea, and most conspicuous. Trois Pitons and mount Miestrin respec-

* Chiefly from the survey and remarks by Staff-Commander G. Stanley, R.N., in 1872: *See* Admiralty charts:—West Indies, Sheet III., No. 2,600; No. 697, Dominica island; and No. 728, plans of anchorages in Dominica.

tively 4,672 and 3,891 feet in height, lying in a north-westerly direction about 5 miles from the town of Roseau, are the second principal features of the mountain range, which continues irregularly to the southern point, varying in height between 2,000 and 4,000 feet. Soufrière, the southern bay and valley of the island, has several openings, around which sulphur in large quantities can be obtained. In the Roseau valley there are several boiling springs, the principal one being 4 miles from the sea, and near the Wotten Waven estate.

About 6 miles north-east of Roseau, and more than half-way across the island, on the top of a high mountain and surrounded by others more lofty, is a lake of fresh water covering several acres. The valleys are fertile and watered by numerous streams, which abound with excellent fish. The dry season (February and March) only lasts for about six weeks; in the remaining part of the year much rain falls. The highest mountains are only seen on an average twice a month. The greatest rainfall is in August and September, and during these months hurricanes and thunderstorms are frequent and violent. The minimum temperature is 75°, maximum 90°; the latter is experienced for fully three months in the year. The annual rainfall at Roseau is about 80 inches; in other parts of the island it is even more. The southern part of the island is healthy, mild fevers alone prevailing as in other healthy part of the West Indies. Prince Rupert bay and the north-eastern part are considered unhealthy.

The principal articles of export are rum, sugar, molasses, coffee, &c. The population in 1881 was 28,211. In 1884, 521 vessels, amounting to 131,551 tons, entered inwards, and in the same year the total value of imports was 60,536*l.*, and of the exports 38,174*l.*

There are several good roadsteads on the western side of the island, the principal of which is Roseau, where is situate Charlotte town, the capital of the island.

Caution.—Vessels sailing under the lee of Dominica should be on their guard against the heavy squalls which come off the high land and through the deep valleys, blowing with great force during the strong trades. Off Soufrière bay and the Layou valley are the two most dangerous places. When the trades are light, calms are frequent.

Le Cachacrou or Scott head, the south-west point of Dominica, a small promontory 234 feet high, and connected to the island by a narrow neck, is a conspicuous object, and when seen from the north or south clear of the land appears as an island. West, one-sixth of a mile from the north part of the head, is a rock with 7 feet on it at low water. Scott head should not be approached to within a distance of half a mile.

Soufrière bay is north of Scott head, and one and a half miles wide; this cannot be recommended as an anchorage, as it is so very steep-to, small droghers having to make fast to the shore as well as anchor.

Point Michelle is N. $\frac{1}{2}$ W., $2\frac{3}{4}$ miles from Scott head; on the point is a well-built Roman Catholic church, with a large conspicuous cross south of it. Off this point, with the church south of East, and $1\frac{1}{2}$ cables off shore, a vessel may anchor in from 5 to 8 fathoms. Care must be taken to let go the anchor smartly, as the water deepens so suddenly, and drifting a few hundred feet will change the depth from 10 to 20 or 30 fathoms.

ROSEAU.*—The town of Roseau stands on one of the few sloping points found on the coast of Dominica, and is 5 miles distant from Scott head, and immediately south of the Roseau river. The table land of mount Bruce, which is 475 feet high and dotted over with old military buildings, overlooks the town. Fort Young and the conspicuous square-built courthouse are slightly higher than the other buildings in the south part of Roseau. The spire of the Roman Catholic cathedral is the most conspicuous object, and is distinctly seen when approaching from the north or south. The telegraph cable to Guadeloupe and Martinique is landed in Woodbridge bay, a short distance north of Roseau river. The telegraph office is in fort Young.

Anchorage.—The best anchorage off Roseau is with the courthouse, a building to the south-west of fort Young, bearing between North and E.N.E., in from 6 to 8 fathoms water, one cable off shore. The precaution of letting go the anchor smartly must be strictly observed, as the distance between the depths of 9 and 30 fathoms is only about 150 yards. The anchorage off the town cannot be recommended, as it is very steep and there is scarcely room for a small vessel to swing towards the beach.

Tides.—It is high water, full and change, approximately, at Roseau at 1h. 30m. Springs rise one foot 6 inches. To leeward of the island no dependence can be placed on the turn of the tide; for several days the set may be north or south with the direction of the coast, the strength in some places being 2 knots an hour; and within a distance of 10 miles, the set may be quite in opposite directions. On the windward side the flood and ebb are regular; off point à Peine the flood runs with a velocity of 1.5 miles per hour. Off the north-east part of the island, the flood attains a velocity of 2 miles per hour, but the ebb, only half a mile an hour, is hardly perceptible.

* See Admiralty plan :—Roseau roads, No. 728; scale, $m = 6.2$ inches.

Light.—A *red* light is shown from a flag-staff near the new mole when the mail steamer is expected.

Supplies.—The market at Roseau is generally well supplied. Beef, pork, and mutton can be obtained at moderate prices. The island vegetables, of great variety, are excellent and cheap, and fruit is plentiful. Vessels lying here, water from the river.

Woodbridge bay* is $1\frac{1}{4}$ miles wide, and lies between Roseau on the south and the high land of mount Daniel on the north. A conspicuous row of palms, running in an easterly direction, and leading up from the Goodwill estate, which is in the southern part of the bay, is an excellent guide. The table lands at the back of the bay, intersected by ravines, are much lower than mounts Bruce and Daniel. Off the north point of the bay, rocks extend for a cable, and on a coast so steep and free from dangers, show out conspicuously. Good anchorage can be obtained in from 8 to 12 fathoms $1\frac{1}{2}$ cables from the beach, with the Goodwill chimney just open to the southward of the conspicuous row of palms, bearing E. by S. $\frac{1}{2}$ S., and Scott head touching the shingly point of Roseau river.

Water may be obtained from a river in Woodbridge bay, but the beach being rough and stony, it is attended with much inconvenience.

Layou river.—The coast from mount Daniel runs in a N.N.W. direction, with slightly indented bays. Layou river, the largest in the island, is just 6 miles from the shingly point of Roseau river; when seen from the westward the entrance may be easily distinguished by the lowness of the land. The source of the river lies near the foot of the Couronne hill, which is comparatively low when seen with Diablotin to the north, and Trois Pitons to the south. Good anchorage for droghers can be obtained north or south of the entrance to the river, 2 cables from the shore, the depths being 8 and 10 fathoms. The northern anchorage is most frequented by small craft shipping wood or sugar. In a S.W. by S. direction from the entrance of the river, the water is very deep, and at anchoring distance off shore there are 40 fathoms. Wood in large quantities is shipped from this river.

Grand Savanna is the largest sloping piece of land on the western side of the island. From Scott head it is distant 15 miles, and is 12 miles southward of cape Melvil or Capuchin. This sloping piece of land is generally extremely parched in appearance, with little or no cultivation.

* See Admiralty plan :—Woodbridge bay, No. 728; scale, $m = 6\cdot2$ inches.

Anchorage.—The western point of Grand Savanna brought to bear E.N.E., distant about 3 cables, and in from 10 to 20 fathoms, rock and sand, is the best anchorage ground. Closer inshore there are several patches of mushroom rocks, which a vessel's cable is likely to foul and be difficult to recover. From Grand Savanna the land extends in the same N.N.W. direction for nearly 4 miles. The coast is steeper and more rugged than immediately to the southward, the rugged cliffs terminating the long and regular slopes which fall from mount Diablotin, being of considerable height.

Wood and Water.—A small river immediately North of the Grand Savanna is favourable for watering, and wood can be obtained at moderate prices.

Barber's Block, a conspicuous hill 1,234 feet in height, lies 5 miles to the northward of Grand Savanna. When seen from the north or south it is, as its name denotes, like a barber's block, the facial part being the summit and shoulders of the hill. From a westerly view it makes like a sharp cone.

Prince Rupert bluff, the northern head of Prince Rupert bay, is a steep bluff surmounted by two remarkable hills, known as the east and west Cabris, 473 and 623 feet high respectively. To vessels coming from northward or southward they appear as islands, but they are joined to the shore by a neck of low swampy ground; this prominent peninsula forms the north side of Prince Rupert bay.

Prince Rupert bay,* 3 miles wide and one mile deep, lying between Prince Rupert bluff and point Ronde, is the best anchorage in Dominica. In the north-east part of the bay, and facing the beach, is the small and dilapidated town of Portsmouth. The Roman Catholic church, with its tall spire, stands a few hundred feet from the shore. The Methodist chapel, a white building, is one-third of a mile inland, and on the foot of a long low spur. Morne au Diable, 2,917 feet in height, stands to the north-east of the bay, the spurs from its summit meeting those from mount Diablotin, at the back of the bay in a neck about 600 feet high.

Anchorage.—The most convenient anchorage is in about 8 fathoms, sandy bottom, with the Roman Catholic church bearing N.E. $\frac{1}{2}$ E., and the extreme of Prince Rupert bluff, N.W. by W. North or south of this position the anchorage is good, but not so convenient for obtaining wood and water.

* See Admiralty plan :—Prince Rupert bay, No. 728; scale, $m = 3$ inches.

Supplies.—Prince Rupert bay is the best and most convenient place for obtaining wood and water. Wood is brought alongside at from 10 to 12 shillings per cord. The Indian river, which is south of the Roman Catholic church, is a good place to water from. A market is held in the town on Saturday, and is generally well supplied.

If bound to this bay from the eastward, it will be better to pass to windward of the island and round its north end, to avoid the risk of being becalmed under the high lands.

Douglas bay is directly north of Prince Rupert bluff. Small vessels visit this place for firewood. Anchorage may be found in from 5 to 8 fathoms, sandy bottom, $1\frac{1}{2}$ cables off shore. From the north point of Douglas bay to cape Melvil, the north-west point of Dominica, the coast is cliffy and steep-to.

Point Jaquet is the eastern point of the northern extreme of Dominica, and from this point the land runs nearly in a straight line W. $\frac{1}{4}$ S. for 2 miles to cape Melvil; the coast between these points is a bold and lofty cliff, about 1,000 feet above the sea near the centre, decreasing in height towards its extremes.

La Soye point is one mile to the westward of Crumpton point. A small anchorage of 4 fathoms is formed by the point and reef stretching to the north-west, but is very confined, scarcely allowing a small schooner room to swing at her anchors; vessels are steadied by lawlers made fast to the shore. A pier is built inside the point, and the landing is easy. The bays to the westward of Crumpton point afford good landing for about 4 miles, when again the coast to point Jaquet assumes a rugged character.

Crumpton point is the north-eastern point of the island. The coast to the westward for 6 miles is low, with alternate cliffs and sandy bays.

The coast.—The character of Dominica in the north-east quarter presents a distinct contrast when compared with any other portion. The land rises from the sea less abruptly, the soundings off the coast showing a continuation of this gradual slope, 100 fathoms being found $3\frac{1}{2}$ miles off shore. Mounts Concorde and Grand Bois, in the north-east quarter, are respectively 2,106 and 3,034 feet in height, the latter being 3 miles from the coast.

Captain Scott rock, the only danger off the windward side of the island, is under water, and lies $2\frac{1}{2}$ cables from the first point north of Pagoua bay. There are 16 and 18 fathoms on the eastern side of the rock, the sea breaking heavily over it in strong trades.

Pagoua bay lies to the northward of Pagoua point; the northern shore of this bay, known as North end, trends round to the north and west to Petit Marigot, one of the few landing places on the windward side of the island.

St. David bay, to the northward of Grand Marigot bay, lies midway between the north and south points of Dominica; on its south side is a small rocky islet, which, with an adjacent promontory, affords shelter for droghers. With a northerly wind a heavy sea sets in, making it difficult for vessels to put to sea. The anchorage is only safe with the wind south of E.N.E. In the valley is the well-cultivated estate Castle Bruce; all its produce is shipped in droghers, which anchor under the rocky islet. A large pier is being built near the centre of the bay. A conspicuous range 2,400 feet high rises over St. David bay, and runs to the northward almost parallel to the coast for nearly 5 miles, terminating near Pagoua point.

Point à Peine is one of the most eastern points of the island: on either side is a deep indentation known as Grand Marigot on the north, and Petit Soufrière on the south. Over point à Peine is a sharp hill which rises to the height of 1,014 feet. The point forming the south part of Petit Soufrière bay is Rosalie; south of this is an estate of the same name, at the foot of a deep valley, which commences but a few hundred feet from the top of one of the highest mountains.

Point Mulatre is 2 miles northward of mount Paix Bouche, and is the commencement of a regular line of cliffs. La Plaine, on which stands a Roman Catholic church, is on the most level part of this land, and is distant 3 miles from point Mulatre. The Grand Soufrière range, 3,551 feet high, rising over point Mulatre and la Plaine, are connected by ridges with the main chain of mountains which runs through the island.

Mount Paix Bouche, 1,585 feet high, rising over the dark, steep, and rugged cliffs, is the continuation of a sharp and defined ridge of hills on the south-east part of the island, the highest point being 3,277 feet above the sea. The coast here is very steep, the depth of a hundred fathoms being found at little more than half a mile from the shore.

Grand bay, the principal and safest anchorage on the windward side of the island, lies in a north-easterly direction about 2 miles from point des Fous. The largest and best cultivated estate near the bay is Geneva; with a water-mill one-third of a mile from the beach. Grand bay terminates in a comparatively low point call Carib. Under this point and close in shore, small vessels may anchor in from 5 to 10 fathoms, and find shelter during the greatest strength of the trades, when the wind is north

of east. When the trade becomes slack, and inclined to veer round to the south-east, the anchorage is not safe.

Morne Fous, two miles East of Scott head, is a remarkable conical cliff, rising to the height of 1,251 feet. When viewed with the higher land as a background, the steep cliff which falls almost perpendicular to the sea has a most striking appearance, and when seen clear of the land it appears as a cone. The eastern extreme of this cliff is known as point des Fous.

GUADALOUPE.

This island* was discovered by Columbus in 1493, on his second voyage, and so named by him in honour of Santa Maria de la Guadeloupe. It was called by the natives Quéraquera. The French colonized it in 1635, and it has remained almost ever since in their possession. It may be more properly described as two islands of nearly equal dimensions, being divided near the centre by a narrow boat channel about 4 miles in length north and south, called the river Salée. With Guadeloupe the islands of Desirade, Petite Terre, Mariegalante, and the Saintes form a group, and are its dependencies, as are also the island of Saint Bartholomew with its outlying rocks and islands and the north part of Saint Martin.

The eastern part is named Grande-Terre; the western forms two divisions, the eastern of which takes the name of Cap-est-Terre, the western that of Basse-Terre; this separation is formed by a range of lofty mountains running north and south; at the latter end the Soufrière, an active volcano, rises to the height of 4,870 feet, is often seen to smoke, and flame is frequently emitted.

Grande-Terre, the eastern division of Guadeloupe, is somewhat in the shape of a right-angled triangle. Its north-east side, from North point (Grand Vigie point) to Château point, is about 23 miles; its south side, from the latter point to Pitre point, is about the same length; its west side, hence to Antigue point, 12 miles; and the north end, from Antigue point to North point, is about 5 miles. It is almost a level plain, the range of hills called St. Anne occupying the centre, and is but scantily watered; when about 12 miles to the north-east it makes like two low flat islands, the western mountain range appearing in the background.

Basse-Terre, the western division of Guadeloupe, is about 23 miles in length, and near the north end 13 miles in breadth. The north side of this division and the west side of Grande-Terre form a deep bight, studded

* See Admiralty charts:—West Indies, Sheet III., St. Domingo to Dominica, No. 2,600; scale, $d = 5$ inches: And Guadeloupe Island, No. 885; scale, $m = 0.5$ inch.

with shoals and islets dangerous to navigate without the assistance of a pilot. In a bight formed by the two islands on the opposite or south side, the numerous shoals which bar the entrance to Pointe-à-Pitre require to be approached with equal caution. The remaining portions of the coast present but little danger.

Guadaloupe like all the other West India Islands is in direct telegraphic communication with Europe; there is also a local telegraph from Pointe-à-Pitre and Mouli to Basse Terre: it is proposed also to connect Les Saintes.

Besides the English and French Atlantic packet steamers to Europe a service is established between Point-à-Pitre and Canada.

The capital of Guadaloupe is (Fort-Louis or) Pointe-à-Pitre, which stands on the south-west end of Grande-Terre at the entrance of the river Salée. The chief commercial city is Basse-Terre, a little to the north-west of Vieux fort point, where the government authorities reside. In 1880 the whole population of the island and dependencies amounted to 177,945, out of which total 20,338 were settlers and 900 soldiers of the garrison. The chief produce is sugar and manioc, but cocoa, coffee, cotton, &c., are cultivated in small quantities. In the year 1879, 176 French vessels, amounting to 28,587 tons, besides 302 foreign vessels, entered inwards; and 148 French vessels, equal to 28,850 tons, and 229 foreign vessels, cleared outwards. The imports amounted to 1,156,706*l.*, and the exports to 1,199,680*l.*

Port St. François* lies nearly 6 miles westward of Château point, the east end of Guadaloupe (which is about 145 feet high, and remarkable with two sharp-pointed rocky islets close off its north-east extreme). This port is merely a reef harbour, and only used by small vessels. A conspicuous tree in line with the east end of a large building near the shore N. $\frac{1}{2}$ W. leads through the channel in 14 feet; it is also marked by a buoy to be left on the starboard hand entering. The outer anchorage in from 11 to 4 fathoms is easily picked up by the eye; the tops of the houses are generally painted red; the church can be readily distinguished, a bearing of which will lead up to the outer anchorage.

St. Anne anchorage,† 7 miles farther westward, is a similar small harbour; to enter it by the Grande passe, which is only about 80 feet wide, keep the ruined tower of Plaisance in line with the east angle of the gaol N.N.W. $\frac{1}{2}$ W.; the least water on this line is 5 fathoms; anchor when well within the reef in from 3 to 4 fathoms, taking care to avoid the 2-fathom patch near the centre; the Petite passe, on the west side of the

* See Admiralty plan :—St. François Anchorage, No. 491; scale, $m = 6$ inches.

† See Admiralty plan :—St. Anne Anchorage, No. 491; scale, $m = 6$ inches.

middle cays, carries only $1\frac{1}{2}$ fathoms, the gaol on a N. by E. bearing leads through it.

Diamants or Petit-Havre* and Gozier islets.—Two miles to the westward of St. Anne are two remarkable islets, named the Diamants or Petit-havre, lying close to the shore; there is indifferent anchorage between these islets and the coast in $3\frac{1}{2}$ fathoms, with Simouet mill north, and Petit-havre point E. by N. Nearly 4 miles W.N.W. of them is Gozier isle, circular, very low, sandy, and about a quarter of a mile in diameter; it lies about half a mile off the town of the same name, and in the channel between there are from 10 to 16 feet water; it is fringed with a coral reef. A berth of three-quarters of a mile should be given these islets. At Gozier commences the outer line of shoals and cays, which extend about 6 miles in a south-west direction to Goyare point.

LIGHT.—On Gozier islet is a tower built of masonry, white, and circular in shape, from which is exhibited a *fixed* white light visible 12 miles. It is also a station for pilots.

Grande bay.†—About a mile westward of Gozier is Grande bay, the west end of which is a bold headland of moderate elevation, on which are the forts de l'Union and Fleur-d'épée, these, with that on islet à Cochons, protect the anchorage, and the entrance to the river Salée. There is good anchorage in $4\frac{1}{2}$ fathoms, with fort Fleur-d'épée N.E. by N., and Gozier lighthouse E. by S. $\frac{1}{2}$ S.

The Bay of Pointe-à-Pitre,† formed by the coasts of Grande-Terre and Cap-est-Terre, is of some extent, with numerous islets, cays, and dangerous banks. The largest and most conspicuous of these islets are à Cochons, à l'Anglais, Frégate-de-haut, and Frégate-de-bas, but it is often difficult to distinguish them from the land. The outer edge of the banks named Mouchoir Carré, Mouton Vert, and caye à Dupont, is about $1\frac{1}{2}$ miles south-east of the islets; these banks are on the west side of the channel leading to Grande bay, and the Saintes kept open of Guadeloupe clears them to the eastward. For a large ship a pilot is most necessary.

Two and a half miles W.S.W. from Gozier islet, is the Mouchoir Carré; it is of small extent, with about 12 feet water on it, and generally breaks. A bell buoy surmounted by a mirror is moored north-eastward of Mouchoir Carré. From the buoy, Bacchus point is in line with the north extreme

* See Admiralty plan:—Approaches to Pointe-à-Pitre, No. 804, with plan of Petit-havre, scale, $m = 2\cdot8$ inches.

† See Admiralty plan:—Approaches to Pointe-à-Pitre, No. 804; scale, $m = 2\cdot8$ inches.

of Frégate de Bas islet; Gozier islet lighthouse bears N. 73° E.; and Manroux lighthouse N. 14° W. West of this, about half a mile, is the Plate, a coral patch with 19 feet water on it. About a mile S.S.W. from Mouchoir Carré is Mouton Vert, on which there are 16 feet water, it extends half a mile to the north-west, and there is at that end a patch with 12 feet water on it; although the sea rolls heavily over this bank, it does not break, and is therefore not so easily distinguished. Three-quarters of a mile to the southward of this is the cay à Dupont, half a mile in extent, and with two patches awash. Nearly mid-channel between these two latter shoals is a coral head, with 20 feet water on it. About half a mile to the southward of cay à Dupont is the northern edge of the cay Martinique, and which extends to Goyave point. The channels, however, between the shoals and islets within them are navigable for small vessels bound to Petit-Bourg, Goyave, and Ste. Marie, on the eastern side of Cap-est-Terre.

Directions.—The principal channel for vessels of moderate draught lies about $1\frac{3}{4}$ miles W.S.W. of Gozier isle. The bell buoy may be steered for bearing about W. by N., passing it close to on either side, thence to the outer buoy of the narrows leading to the inner harbour; or if it be intended to anchor in Grande bay, the outer road of Pointe-à-Pitre, haul up for it when point de la Verdure bears E. N.E.

Vessels may also pass about midway between the bell buoy and Gozier island. Jarry mill, in ruins and not easily discernible, bearing N.W. leads between two patches of 20 feet.

To enter by the channel between Mouchoir Carré and Mouton Vert, which is more than a quarter of a mile wide, and has 7 fathoms water, (with a shoal of $4\frac{3}{4}$ fathoms a little north of the line of leading marks,) bring point Bacchus in line with the north-east extreme of isle à la Hache, N.W. by W., and when point à John comes on with point Goyave, the vessel will be inside the reefs, and if bound to Pointe-à-Pitre may haul up for isle à Cochons on this leading mark.

The deep channel between Mouton Vert and cay à Dupont is narrowed to a cable and a half by the coral head, with 20 feet water on it, point Bacchus in line with the west extreme of isle à Cabrit, N.W. $\frac{1}{4}$ N., leads between this patch and cay à Dupont, and when point à John is on with point Goyave haul up as before directed.

The north extremes of the islets Tome and Fortune in line W. $\frac{1}{2}$ N., lead between cay à Dupont and the shoal extending off cay Martinique, and if bound to Goyave, the latter islet may be rounded at 4 cables distance.

POINTE-À-PITRE, near the entrance to the river Salée, is approached by an intricate channel about three-quarters of a cable in width,

but having 5 fathoms water ; it is formed by Cochons island and the cays northward of it on the west, and by the islets and reefs extending from the shore on the east. This channel is marked by four buoys on the east and one on the west, those on the east side must be passed close on the star-board hand entering ; the outer, at the extremity of the reef off cay d'Argent, is *black* and flat hexagonal ; the next, about a cable to the northward, is a *white* warping buoy ; the next, on the edge of the reef off Rat isle, is a square black buoy ; the inner one, off Manroux island, is square white. On the west side, off the shoal water of Cochons island, is a white hexagonal buoy. The cays on the west side have perches:—One in $1\frac{3}{4}$ fathoms on the eastern edge of Rose bank with $2\frac{1}{2}$ and 3 fathoms close to ; one on the eastern edge of Couillons bank, where the sea breaks in one foot water ; one on the N.W. edge, and another on the S.E. edge of Provençal bank. All the above are square wooden posts.

The anchorage off the town is perfectly secure, varying in depth from 2 to $4\frac{1}{2}$ fathoms ; small vessels may lay alongside the wharves. A spit extends westward of the northern wharf, having at its extreme a patch of 6 feet, marked by a red buoy on its south side.

LIGHTS.—Manroux island.—A *fixed* white light is shown from Manroux island visible 5 miles, and a *red* and *green* light is shown from the outer buoy on the east side, and a *green* light from each of the two inner buoys. A *white* light is shown from the buoy off Cochons island.

Fouillole point.—Beacon and light.—An iron beacon, painted red and surrounded by a cage, is situated on Fouillole point, close to the water's edge. A sector of *red* light over an arc of 13° is exhibited from the beacon at an elevation of 75 feet above the sea, and is visible in clear weather from a distance of 6 miles.

Tides.—It is high water, full and change, at Pointe-à-Pitre at 10h. 0m. ; springs rise $1\frac{1}{4}$ feet.

Supplies.—There is a coal depôt at Pointe-à-Pitre,* provisions may be procured, and water is easily obtained.

Pointe-à-Pitre is considered very unhealthy, especially in the winter months, but it is hoped to improve it by bringing a large supply of water into the town, and by filling up the canal or open sewer that surrounds the town.

The Atlantic steamers call here, and enter the port by night, the channel is so well lighted.

* In 1883 there was no coal to be obtained at Point-à-Pitre.

Petit Bourg, Goyave, and St. Marie, are anchorages frequented by small vessels, and are easy of access to those acquainted with the locality.

In May 1884 a light buoy was moored in the channel between Gros-loup and Les Peignes in the north entrance to St. Marie harbour. It shows a fixed red light, visible 3 miles to be left on the port hand on entering; this port is being improved.

From Cap-est-Terre point the coast trends in a S.S.W. and S.W. direction for 12 miles to Vieux fort point, the south end of the island.

BASSE-TERRE,* 3 miles N.N.W. of Vieux fort point, is an open roadstead. Vessels bound to this road having rounded the above point, which is bold and steep-to (but off it are moored many fishermen's nets, and big spars or bamboos, which are a danger to paddles or screws, and should be avoided), should luff up, keeping the shore close aboard, and anchor off the town, as most convenient, within the buoys which are placed near the edge of the narrow bank of soundings. The depth is from 16 to 22 fathoms at $1\frac{1}{2}$ to 2 cables from the shore. A heavy swell generally rolls in on the coast, and should the wind veer to the S.E., vessels must be prepared to quit.

The Governor's house is partially hidden by trees; below it is a large military hospital, the two wings of which will soon be finished (1883); to the left are the barracks and other military buildings. A fine hospital for foreigners has recently been erected at the foot of camp Jacob on an isolated plateau.

Vessels sailing along the lee side of the island must be prepared to meet the sudden violent gusts which rush down the gorges of the mountains.

LIGHTS.—A *red* harbour light, visible 5 miles, is exhibited from the mole, and a similar one, but of less elevation, at the end of the wharf.

Water may be readily obtained without removing the casks from the boat, but there are no coals. This side of Guadeloupe is far better supplied with water than Grande-Terre, and it is said that not less than 50 small streams find their way into the sea between Vieux fort point and the north-west end of Basse-Terre.

WEST COAST of GUADALOUPE.—Between Basse-Terre and Grande-anse, 20 miles to the N.N.W., there are many small bays affording anchorage for small vessels. The principal are named Du-plexis, Barque, and Bouillante; the latter is 9 miles from Basse-Terre, and receives its name from the two hot springs in the neighbourhood. At $1\frac{1}{2}$ miles farther on is Criquet bay, sheltered on the west by Goyaves

* See Admiralty plan, No. 491; scale, $m = 5.7$ inches.

island, leaving between it and the shore a channel called the *Passe-des-vaissaux*. Beyond this are those of Caillou, with the town of the same name or Point Noire, where landing will be found to the south of the village on a beach of grey sand. Ferry, des Hayes, and lastly Grande-anse, which is separated from the last named by the lofty promontory of Gros-morne.

From Gros-morne the coast trends to the north-east for 5 miles, off Perle bay and about a mile from the shore a sandbank extends to the northward for about $1\frac{1}{2}$ miles, beyond which is point Bas-vent. Point du Vieux fort St. Pierre, the north-west extreme of the island, is remarkable, with the small grey islet, *Anglais*, skirted by reefs, about $1\frac{1}{2}$ miles north-west of it. Hence the coast turns suddenly to the eastward, continues very high, and should be navigated with extreme caution.

Lights.—A fixed *red* light is exhibited, at an elevation of 69 feet, from the north point of entrance to Barque cove, visible 9 miles. A *fixed* light is also shown from a mast 20 feet high, in the inner part of the cove.

Winds.—On the west side of Guadaloupe a light land wind generally blows off during the night, as far as 2 miles from the shore, and it will be found advantageous to vessels proceeding either to the north or south. Beyond that distance calms and light baffling winds frequently detain them many days; and if they cannot take advantage of the land wind, it will be prudent for them not to approach the west side of the island nearer than 20 or 24 miles.

Tide and current.—A strong S.E. current frequently prevails on the western side of Guadaloupe, and appears to be influenced entirely by the strength of the trade wind. There is but little rise of tide.

NORTH COAST of GUADALOUPE.—About a mile and a half northward of Vieux fort point lies Kahouane islet, at the west end of a reef which extends along the shore, increasing its distance off to 3 miles, to within about 2 miles of the west side of Grande-Terre. On this reef are several small cays, which serve to warn a vessel of her approach to the reef when beating to windward; and within it there is a good channel for small vessels. There are also several cuts through it, navigable for vessels bound to the small bays of Rose, Lamentin, and Mahaut.

The best of these passes are, Grande-Coulée, between the reefs which extend from the east side of *Anglais* isle, and the west side of *Blanc* isle, in which there is a depth of $8\frac{1}{2}$ fathoms; *passé à Carot*, between the islet of that name and *Fajou* isle, has a depth of $4\frac{1}{2}$ fathoms; and *passé à Colas*, the most eastern, is of greater depth, but neither of them can be navigated safely without the assistance of a pilot, though the water is so clear that the shoals can generally be seen from a short way aloft. In working

up the channel within, it will be advisable to border towards the reef, particularly after passing to the eastward of Rose bay, when the shore becomes skirted by reefs and cays.

Rose bay, about East $4\frac{1}{2}$ miles from Anglais isle, is sheltered on the north by a reef, through which are two small openings, with a depth of from 15 to 22 feet; the western opening leads to the small bay of Rainée; the Grande-Coulée channel lies North of it. On this part of the shore a long, low, narrow, level plain lies at the foot of the great mountain range.

Lamentin bay.—Nègre point, the extremity of a narrow ridge of land, separates Mahaut bay from that to the west, named Cercelle; and west of the latter is the bay of Lamentin, with the town of the same name. These bays are obstructed by sand-banks, and only navigable for very small vessels.

A small river of the same name runs into the sea at the head of the bay, and Grand river, the principal stream of Guadeloupe, which rises in the central mountains, empties itself near the north point of the bay.

Mahaut bay is about 6 miles eastward of Rose bay, on the north side of the narrow tongue of land which separates Grande-Terre from Cap-est-Terre. There is excellent anchorage in the outer part in 7 or 8 fathoms water, and farther in off the town in from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms. The best pass to enter is the Caret, about 4 miles N.N.W. of the bay, and Fajou isle on the east side of this opening bears North from it.

To the eastward of Mahaut bay, and south-east of the little islet of Christophe, is the north entrance to Salée river, which separates Cap-est-Terre from Grande-Terre.

Petit Canal bay, on the west side of Grande-Terre, extends from Macou point, which lies 4 miles northward of the entrance to the river Salée, to Grisgris point, 3 miles to the northward of it; it is, however, only an anchorage for droghers, who find their way by the eye, through the reefs fronting it to the westward.

Port Louis* is an open roadstead, about 3 miles farther to the northward and $2\frac{1}{2}$ miles to the southward of Antigue point, the north-west end of Grande Terre. Anchorage will be found off the town in 8 fathoms water, about a quarter of a mile from the shore. This part of the coast is foul to the distance of 2 cables, and the bank does not extend beyond two-thirds of a mile off shore, at about which distance a vessel may anchor in 19 or 20 fathoms water. Souffleur bay is a small bight northward of the town, with a few rocky heads above water in the centre.

Light.—A small fixed light, visible from 4 to 5 miles, is exhibited in port Louis.

* See Admiralty plan :—Port Louis, No. 491; scale, $m = 4.8$ inches.

From Antigue point to Grande-Vigie or North point, and thence to the south-east as far as Ste. Marguerite bay, the eastern shore of Guadaloupe is bold and clear, with rocky cliffs about 200 feet high.

Ste. Marguerite bay is an open roadstead, without any protection from the trade wind, and consequently not safe. From this bay the shore again becomes foul to the distance of from one to 2 cables as far as Château point.

Port Moule,* nearly midway between North and Château points, is the most frequented on the north-east coast of Grande-Terre, in consequence of the shelter it affords; but it is inconveniently small, being somewhat less than three-quarters of a cable in breadth, and cannot be entered without the aid of a pilot. The coral bank which extends along the coast protects the port, and is here about a third of a mile in breadth, with two narrow openings.

The western opening, named the Hastings passe, is about 20 yards in breadth, and bounded on the north by a reef with 2 fathoms water on it; and on the south by the Mouton-de-Bas reef, which partly dries; this pass is used for leaving the port, it lies S.E. by E. and N.W. by W., and carries from 5 to 7 fathoms water.

The Grande-passe leads over the outer reef in $2\frac{3}{4}$ fathoms, which depth will be kept across it, and till getting in the narrow channel of the harbour, by keeping St. Jean mill in line with the north angle of Mr. Tillot's house S. $\frac{3}{4}$ E. The anchorage in about 4 fathoms water is well protected by Mouton de Haut and other reefs that uncover, and on which are anchors to make fast to. In case of necessity small vessels may anchor to leeward of the eastern reef in $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms water.

The Grande-passe is the best for entering the port, but it is difficult for a sailing vessel to leave by it. In moderate weather a vessel may anchor outside the reef in 9 fathoms, with the lighthouse about S. $\frac{1}{2}$ E. When a vessel cannot enter the port, a red flag is hoisted; but a white flag with red square indicates that a vessel may approach for a pilot.

LIGHT.—On the extremity of the land west of the port, north of the town, and about 20 yards from the flag-staff, is a tower, which shows a *fixed* white light, visible 7 miles.

Gourde islet.—From port Moule to Château point there is no safe anchorage. About $4\frac{1}{2}$ miles north-west of the latter is Gourde islet, which is rather remarkable, and lies just outside the reef, which is steep-to.

* See Admiralty plan :—Port Moule, No. 491; scale, $m = 6$ inches.

Rollers, which are frequent from October to May among the Virgin islands, and the groups north-west of Guadaloupe, sometimes extend to this island, and as they set in from the south-west, vessels should be prepared during these months.

LES SAINTES.

This group of small islands*—so called from having been discovered on All Saints day—is attached to the government of Guadaloupe, occupying a space of about 5 miles in length E.N.E. and W.S.W., and 3 miles in breadth. They lie 15 miles north-west of Dominica, and 6 miles south of Guadaloupe, and the channels both north and south of them are quite free of danger. The easternmost and largest island, named *Terre-d'en-Haut*, is separated from the westernmost island, named *Terre-d'en-Bas*, by a channel nearly half a mile wide, safely navigable for vessels of the largest draught. In 1873 the population of the Saintes was about 1,430.

Water.—The Saintes are but scantily supplied with water, the inhabitants depending chiefly on what they are able to catch in tanks. No wood is to be obtained.

Terre-d'en-Haut island is about $2\frac{1}{2}$ miles in length N.E. and S.W., but its shores are so irregularly shaped that it varies in breadth from a quarter to three-quarters of a mile. It is of moderate elevation, its highest part being at the south-west end, where mount Rossel, called also des Filles, and on which is a tower, rises to the height of 1,044 feet above the sea; the shore to the north-west of it terminates in a bold promontory, known as the Sugar-loaf. The town is on the west side of the island, in a deep bay, and fronting it is Cabrit islet; the south point of this islet is named Sable point, and is remarkable by fort Louis, 264 feet above the sea, and which defends the bay and town; near the south-west bay is the lazaretto.

There is temporary anchorage with the prevailing winds in from 7 to 11 fathoms water, about 2 cables south-east of Boisjoli point; westward of Redonde islet there are shoal patches of 10 and 12 feet; but the principal anchorage off the town, about half a mile in extent, is so well sheltered on the west by the island of Cabrit as to make it a safe harbour, with depths

* See Admiralty chart, No. 885, Guadaloupe embracing les Saintes; also see plan of les Saintes anchorage No. 491, scale $m = 4.8$. A sunken rock is said by some navigators to exist $1\frac{1}{2}$ miles northward of these islands, on which the sea breaks; but in the *Manuel de la Navigation dans la mer des Antilles*, 1862, page 86, it is stated, "We do not believe in the existence of this danger, and feel convinced that the breaker seen was no other than the Baleine du large (outer Whale rock), of which the distance is greatly exaggerated."

of from 9 to 14 fathoms. Vessels not wishing to enter the harbour will find excellent anchorage in the outer road, between the south-west side of Cabrit and the Sugar-loaf, in from 10 to 13 fathoms good holding ground. When coming from the northward, the west end of Cabrit may be rounded at a cable's length.

The Northern channel* (Baleine pass or Whale passage), between Terre-d'en-Haut and Cabrit, is about 2 cables wide, with a depth of from 10 to 18 fathoms. Nearly in the centre of the entrance is Whale shoal, a rocky patch, on which there are only 2 feet water. It is steep-to, and lies $3\frac{1}{2}$ cables W. by S. of Portail point, the north-west end of the island; nearly 3 cables N.E. by E. $\frac{1}{2}$ E. of Bombarde point, the north-east end of Cabrit islet; and N.W. by N. $1\frac{3}{4}$ cables from the Whale rock, or la Baleine. The latter is a rock 8 or 10 feet above water, and somewhat more than a cable from the north-west shore of Terre-d'en-Haut.

Should the shoal not break, the water is so clear that it may readily be seen from aloft. There is also a similar patch, with 12 feet water on it, called the Caille, less than a cable N.E. of Portail point. The channel westward of the Whale shoal is called the Whale passage, and that eastward, or between Whale shoal and the rock of the same name, the passage des Vaisseaux.

Sugar-Loaf passage, $3\frac{1}{2}$ cables wide, is between the south-east end of Cabrit islet and Tête Rouge point, on Terre-d'en-Haut, both of which are bold and steep-to. The passage, however, is obstructed about one-third across by a small coral patch with 6 feet water on it, the marks for which are the summit of the hill at the west end of Cabrit in line with Sable point, and the inner bluff of the Sugar-loaf in one with Cointe point. It does not always break, but the discoloured water points it out; there is a white buoy near its S.E. side. There is a clear passage both north and south of this shoal, with depths of from 6 to 9 fathoms.

Directions.—Vessels bound into the harbour of Terre-d'en-Haut by the northern channel may enter by either the west or east passage. The former is the best, except with the wind to the southward of East, when the latter may be taken with advantage.

By the west passage, which is nearly 2 cables wide, having passed the north end of the island at the distance of about half a mile, steer to the westward until the church in the town comes well open of Anse à Mire point S.S.E. $\frac{1}{2}$ E., or until a white chapel (to the southward of the church), a very conspicuous object, is in line with a beacon with a black triangle on it (the beacon is on top of a hill) the old church is difficult to make out,

* See Admiralty plan, No. 491, Saintes anchorage; scale, $m = 4.8$ inches.

which leads westward of the Whale shoal. A vessel may then haul up for the passage, and anchor as convenient off the town, about $1\frac{1}{2}$ cables from the shore, with the Whale rock just open of the land.

By the eastern passage, steer as above directed until Boisjoli bluff is seen between the Sugar-loaf and point Sable S.W. $\frac{1}{4}$ S. This mark clears the Caille shoal, and leads through the passage between the Whale rock and shoal. When the church in the town opens out, haul up for the anchorage.

The anchorage here is good, safe, spacious, and very healthy. Vessels resort here when driven from Guadalupe or Fort de France by sickness. The climate is said to be particularly favourable for the cure of dysentery. There is a small hospital, to which convalescents from Guadalupe are often sent, besides sick from the ships and garrison. Excellent grapes are grown, but other fruits or supplies are very limited; the little creeks pertaining to the group are rich in fish; game may be had on Gros islet.

Leaving the anchorage it will be better to take the Sugar-loaf channel, passing either to the northward or southward of the 6-feet patch, which has a buoy on its S.E. side. In the former case, stand to the N.W. until the south side of Pâté islet is in one with Pâté point, which mark will lead half a cable north of the shoal.

In the latter case, run out with the church on an East bearing; when the north-west hill of Cabrit is open of point Sable, you will be westward of the patch.

Tides.—It is high water, full and change, at this group, at 6h. 45m.; the rise averages from 18 to 22 inches, but is much influenced by the winds.

Terre-d'en-Bas is about $1\frac{1}{2}$ miles across N.E. and S.W., and $1\frac{1}{4}$ N.W. and S.E. Its shores are but slightly indented, and free of danger to within a cable. At its north end, about a quarter of a mile from the shore, is the small, low, rocky islet called Pâté, bold and steep-to on its east side, but it is foul on its west side to nearly midway between it and Pâté point, at which distance is a shoal of 15 feet, thus contracting the passage between them to the breadth of a cable. By bordering on the shore of Terre-d'en-Bas, a vessel may run if necessary through this channel, and have not less than 6 fathoms water.

There is anchorage, but only for fine weather, on the west side of Terre-d'en-Bas, just to the northward of Gros cape the south-west extreme; and on the east side of the island there are two small coves convenient for droghers.

Grand Islet, about 4 cables southward of Redonde islet, and 554 feet above the sea, is three-quarters of a mile in length east and west, and

at its centre 3 cables in breadth. Off its west end are the rocky islets Coche and Augustins, the channels between being narrow and only fit for boats.

These three islets are bold, but foul ground extends off them in many places for about 2 cables. The channel between Terre-d'en-Bas and Augustins islets carries deep water, but off the west end of the latter a reef projects for nearly 2 cables. The south-east extreme of Cabrit islet, in line with Boisjoli point N.E. $\frac{1}{4}$ N., leads through in mid-channel.

The channel between Grand islet and Redonde is free of danger, but the 10 feet patch west of the latter should be given a berth.

Cabrit islet is of irregular shape, 6 cables long east and west, 4 cables broad at its east end, and it terminates at the west end in a sharp bold headland, wooded to its summit.

MARIE-GALANTE.

This island,* a French possession under the government of Guadeloupe, lies 13 miles eastward of the Saintes, in the channel between Dominica and Guadeloupe, 16 miles N.N.E. of the former, and 15 miles southward of the east end of the latter. The area of the island is about 60 square miles, and its population about 14,000. Its shape is nearly oval, being 10 miles long north and south, and about 8 miles east and west. It is of moderate elevation, and rises gradually from the south towards its north-east end, its general appearance being flat and low. The southern and eastern shores are dangerous, being skirted by a reef to the distance of from 2 to 3 miles. The west side is comparatively clear, and affords anchorage off almost all parts; the soundings generally are regular and gradually diminish towards the shore, but there are patches, and attention to the lead is required.

Grand Bourg,† the principal town in Marie-Galante, is situated at the south-west end of the island, and in front of it is a small reef harbour, with a depth of from 10 to 15 feet. The channel between the southern cays and that of Mayeux has 16 feet water, and is 600 feet in width. Large vessels anchor outside the reef in 8 to 10 fathoms water.

LIGHT.—A fixed white light is shown from a mast in the fort 45 feet above the sea, which may be seen in clear weather above 7 miles.

* See Admiralty chart, No. 885, Guadeloupe, with Marie-Galante.

† See Admiralty plan :—Grand Bourg on west side of Marie-Galante, No. 491; scale, $m = 6.0$ inches.

The light mast in line with the church leads between the Mayeux shoal and the N.W. point of the great reef, this mark also points out the best anchorage in the outer roads in not less than $8\frac{1}{2}$ fathoms, as closer in a vessels roll very much, but the anchorage of Saint Louis should be preferred, where fresh provisions can be procured, and where there is a convenient beach for hauling the seine.

Saint Louis bay, between Cimetière and Folle points, is the best anchorage for large vessels. A good berth will be found about half a mile off the village in 4 fathoms water.

Vieux fort, a small anchorage at the north-west end of the island, and southward of a small islet of the same name; a berth in 5 fathoms will be found with the islet N.E. half a mile, and about the same distance from the shore. A shoal with 3 to 5 fathoms water extends about half a mile northward of this islet, with a detached patch of the latter depth N. by W., three-quarters of a mile. Northward of Cimitière point, about three-quarters of a mile there are also patches of 3 to 4 fathoms water.

Capesterre, a small town at the south-east end of the island, has also a reef harbour.

Directions.—Coming from the northward give Vieux fort island and Cimetière point a berth of a mile, and after passing the latter, a vessel may haul in for the anchorage at St. Louis. From Folle point to the southward the coast should not be approached within a mile, and, as before observed, the south end of the island is very dangerous, and should not be rounded within the distance of 3 miles. Later surveys of 1867-69 does not show the reefs so far off the shore.

Petite Terre, a low sandy island, 2 miles long N.E. and S.W., and a little more than half a mile broad, lies N.E. 12 miles from Marie-Galante, and S.E. $5\frac{1}{2}$ miles from Château point in Guadeloupe, the channels between being free of danger. It should perhaps be more properly described as two small islets, as it is divided near the centre by a narrow cut; the north-eastern half being called Terre-de-Haut, the south-western Terre-de-Bas. All its shores are foul and rocky, to the distance of from a quarter to half a mile; there is a rock named Baleine du Sud (South Whale) S. by W. $\frac{3}{4}$ W., about half a mile from the lighthouse. Also a shoal patch of $4\frac{3}{4}$ fathoms nearly a mile south from the west end of the island, shoal water also extends nearly a mile westward of the west end.

When coming from the eastward, a depth of from 13 to 20 fathoms will be found at 2 miles north and south of the island, and it should not be approached within this distance.

LIGHT.—A lighthouse, 75 feet high, stands 202 yards from the east end of Petite Terre island, and exhibits 108 feet above the sea a *fixed* white light, visible 15 miles.

Bank.—Sans Nom (Vaisseaux banks) about 9 miles westward of Petite Terre, and southward of port St. François, Guadaloupe is a bank with as little as 5 fathoms water on it, and there is also said to be a 7-fathom bank about 7 miles to the north-west of Marie-Galante, but this is very doubtful.

DÉSIRADE.

(Desired island),* so named by Columbus, from its being the first landfall on his second voyage, lies N.E. by E. 5 miles from the east point of Guadaloupe, and is attached to the government of that island. It is of moderate elevation, 6 miles in length E.N.E. and W.S.W., and from 1 to $1\frac{1}{4}$ in breadth, its north-east end being the broadest. Its shores are slightly indented, the north-west side is bold and steep-to but its south-east side is fringed with a coral reef to a distance of 3 cables. Le Mouton, a small rock, lies 3 cables off the east point; and a bank of 7 to 11 fathoms appears to extend at least 2 miles southward from the western part of the island.

Désirade and Petite Terre seemed to be joined by a 10 to 11-fathom bank of soundings of a rocky and coral formation. The population of the island is about 1,600.

The channel between this island and Guadaloupe is frequently taken by vessels bound to the northward that cannot fetch to windward of Désirade; in this case Désirade should be kept aboard.

Grande Anse, the chief town in Désirade, stands on the south-east side of that island, about $4\frac{1}{2}$ miles to leeward of its east end. In front of it there is a small opening in the reef, which will admit droghers into a sheltered anchorage under its lee, and, under very favourable circumstances, large vessels may anchor outside the reef, but the soundings are irregular.

Anse de Mahault (or Mahault bay) near the east end of the island is a similar small reef harbour, on the shore of which is Leproserie (or Lazaretto) village.

Galet anchorage.†—There is good anchorage under the south-west end of the island, in 5 fathoms water, with the two rocks off point Colibris in line, and a remarkable tree in one with a house on the beach

* See Admiralty chart, No. 885, Guadaloupe, which embraces Désirade.

† See Admiralty plan, No. 491, Galet anchorage; scale, $m = 4\cdot8$ inches.

near the middle of the bay, but this anchorage is mostly visited by a double swell rendering communication difficult, a better anchorage is off Grande Anse, as above, but only in fine weather, and on no account under 5 fathoms, as under this depth coral heads prevail.

Soundings.—From about the meridian of the centre of Désirade, the soundings of more than 90 fathoms on the edge of the bank decrease rapidly westward; and about midway between Désirade and Petite Terre, there are only 10 and 12 fathoms water. The water is here much discoloured, showing in light and dark patches for a considerable distance, and the bottom distinctly seen. The depth between Désirade and Petite Terre varies from 9 to 15 fathoms; about midway between Château point and the south-west end of Désirade, the depth is upwards of 188 fathoms.

ANTIGUA.

This island* was discovered by Columbus on his second voyage in 1493, and named by him after a church in Seville, Santa Maria de la Antigua. The first settlement was made by a few English families in 1632, and, with the exception of a very short period from 1668 to 1666, when it was in temporary possession of the French, it has ever since remained a colony of Great Britain. Area about 108 square miles. The population in 1881 amounted to 34,964, of whom 2,146 were white; in 1884, 544 vessels, equal to 190,678 tons, entered inwards, and the total value of imports was 169,500*l.*, and of exports 168,842*l.*

Antigua is $13\frac{1}{2}$ miles in length east and west, $9\frac{1}{2}$ miles in breadth, and when compared with the lofty islands to the southward, may be said to be of moderate elevation; its heights are seldom obscured, and near its south-west end, Boggy peak, the highest part of the island, rises 1,330 feet above the sea. Almost all its shores are deeply indented, particularly the north-east, where there are many bays and creeks navigable for small vessels. This end of the island is from 100 to 300 feet in height, but it rises gradually towards its south-west end, where the hills become very irregular, and so remarkable as to serve as leading marks through the dangerous reefs and shoals which surround almost the whole island. The only clear space is on the south side between Willoughby bay and

* See Admiralty charts :—Antigua island, No. 918, scale, $m = 1\cdot5$ inches, and No. 2,065, Sheet I., scale, $m = 4$ inches. Directions are chiefly from the surveys and remarks by Capt. E. Barnett, and J. Parsons, Master, R.N.

Old road, where it is bold and steep-to ; elsewhere it should be approached with great caution, and with the lead going.

Antigua lies in the middle of the southern edge of an extensive bank of coral and sand, which extends a little northward of Barbuda on its north-east edge. The bank runs off to the south-east to the distance of 5 miles ; from Man-of-War point eastward 7 miles, and from thence the edge forms a wave line to the south-east point of Barbuda. From the west side of Barbuda, the edge is about 12 miles distant, and it is the same distance eastward of the St. Bartholomew bank. From about the parallel of the south end of Barbuda, the western edge of the bank turns to the south-east, forming a deep bight, the bottom of which is 14 miles from the south-west point of that island, and here the bank is only about 12 miles wide, and there is a patch with 7 fathoms water near the centre, the general depths being from 11 to 30 fathoms, increasing somewhat abruptly at the edge. This bight will be found of great value to vessels passing to leeward of the islands in the night, as it will enable them to judge their distance from either ; but the lead must be well attended. There is a depth of 396 fathoms between this island and Montserrat, and 348 between it and Guadaloupe. H.M.S. *Tenedos*, in 1880, sounded on a bank of rock and shells with from 40 to 90 fathoms water over it, which lies from 10 to 18 miles S.S.E. from English harbour.

From Sandy islet at the entrance of St. John, the bank extends westward 12 miles, and terminates abruptly from a depth of 25 fathoms. Thence it turns inwards again to the E.S.E., and the edge comes within 3 miles of the shoals on the west side of the island, and then trends outwards terminating to the south-west $7\frac{1}{2}$ miles from Johnson point.

Green island.—Commencing from to windward, the east end of Antigua may be said to be formed by Green island, the eastern extreme of which terminates in a bold rocky headland, 170 feet high, called Man-of-War point, which is steep-to, and may be rounded at the distance of a mile, but in general the sea rolls in so heavily that it should not be approached to this distance, and great caution should be observed when closing Green island either from the northward or southward.

Ten pound bay is nearly half a mile to the south-west of Man-of-War point, and is unnavigable from the heavy swell which always rolls in at the entrance. Ricket harbour, at the south-west end of the island, affords shelter for droghers under the lee of the reef.

York island is a small rocky islet, about $1\frac{1}{4}$ miles south-west of Man-of-War point, at the south side of the southern entrance to Nonsuch bay, page 104. This island is nearly connected by dry reefs to the shore of Antigua, which thence takes a S.W. direction for $1\frac{1}{2}$ miles, where it terminates in two bold precipitous rocky headlands 215 feet high, very

remarkable from the eastward, especially when the morning sun shines on the white cliffs. In this space are the small bays of Marie-galante, Exchange, and Half-moon. The shore is skirted by a reef, but in moderate weather it may be approached to a mile.

From Hudson point, the southernmost of the above headlands, the coast takes a sudden turn about W. by N. for 3 miles, and then runs to the S.S.E. for $2\frac{1}{2}$ miles, forming a deep bight named Willoughby bay, the north side of which is a remarkable flat woody table-land 350 feet high.

Willoughby bay is capable of affording safe anchorage for large vessels, but so difficult and dangerous of access that it is seldom or ever frequented, the produce of this part of the country being sent by droghers to St. John. The head of the bay is low and sandy, and its entrance is protected by a coral ledge, dry in many parts, through which there are two cuts; that to the north-east, named Horse-shoe channel, is only 75 yards wide, with a depth of 29 feet in it; the other is nearly a cable wide, but so tortuous and intricate that no good marks can be given for its safe pilotage.

Directions.—To enter Willoughby bay by the Horse-shoe channel, run down about a mile off the reef, until Cochrane's mill, on the low land at the head of the bay, is in one with the low rocky point on the south side of Christian cove, bearing N.W. $\frac{3}{4}$ W., which mark will lead through the narrow cut; on the point there is the ruin of a small fort, 40 feet above the sea, but it is scarcely visible. When fort Shirley comes in line with Isaac point S.W. by W., the vessel will be within the reef, and may haul up gradually for the anchorage.

With the prevailing winds, vessels cannot fetch out; and as no safe directions can be given for the other channel, the anchorage in this bay is only free to steamers, and they will require the assistance of an experienced pilot. The bay is exposed to the full force of the sea, which makes it even dangerous to approach in strong winds.

Shirley heights is a remarkable, bold, rocky promontory, rising almost perpendicularly to the height of 545 feet, 4 miles to the south-west of Hudson point. On the flat summit will be seen the barracks and other buildings, formerly the garrison; and at its western edge, a little more elevated, the two signal posts of fort Shirley, which overlooks the entrance to English harbour. Between Willoughby bay and the heights are two small inlets, Mamora bay and Indian creek, which afford safe anchorage to droghers; the entrance to the former is obstructed by a bar with 10 feet water on it; the mouth of the latter is about a cable wide, and has a shoal nearly in the centre, on which the sea generally breaks.

ENGLISH HARBOUR,* mostly visited by vessels of war, is so sheltered that they may heave down alongside the dockyard, and ride out the hurricane season with almost complete security. Water may be easily obtained alongside the wharf from pipes. The harbour is, however, very confined in space, and its turnings are so sharp, that vessels of great length must either steam or warp in.

The entrance to the harbour, which is scarcely a cable wide, lies at the foot of Shirley heights, the west end of which lofty promontory forms south-east side of the entrance at Charlotte point, and a long, low, narrow, rocky ridge, on the south-east extreme of which is fort Barclay, the north-west side. The greatest depth in the narrows is 23 feet, but only on one exact line of direction, viz., the north-west end of the wall of the Governor's house on Dow hill, in one with the rocky point at the north end of the sandy beach in Freeman bay, N. by E. $\frac{1}{2}$ E., both whitewashed, a very doubtful mark, from the hill being so greatly elevated above the point. In the centre of the channel there is a small patch of $21\frac{1}{2}$ feet, consequently the 23 feet channel is not more than 40 yards wide; and as no confidence can be placed in the baffling winds, which come under the heights, no stranger should attempt to follow these directions under sail without the assistance of a pilot, who is always at hand.

Vessels of 17 feet draught may moor alongside (or of 19 feet draught with a 12 feet wide stage between the wharf and the ship) the northern wharf of the dockyard with a bower anchor to the eastward. At times the tide ranges 3 feet, but it is very irregular.

In 1876 H.M.S. *Encounter* found very unpleasant smells from the water alongside after a fortnight's stay alongside the yard, this was imputed to the sewage of the ship, there not being any tide to carry it away. The harbour was frequently sounded, and found to agree mostly with the soundings in the chart, but found the banks off fort Barclay and off the dockyard had increased, and at one very low tide, with the whitewashed marks in line, 18 feet was found. In 1877 H.M.S. *Dryad* prefers mooring to the wharf at the naval yard in preference to the dockyard, as the breeze is on the broadside, and so keeps the ship cooler; the northern wharf (marked \times on the plan) is decayed. Fresh water is not to be obtained here, but only at the dockyard; alongside this pier there is $16\frac{1}{2}$ feet least water without off fasts, by mooring off a little 22 feet may be got. In 1882 H.M.S. *Garnet* found a bollard placed in fort Barclay for a ship moored or anchored in Freeman's bay to run a stern hawser to. The large coal store at the naval yard has been destroyed by a hurricane, and the wharves are dilapidated. In October 1884 H.M.S. *Dido* laid down off fasts from the north wharf of dockyard, and gives the following instruc-

* See Admiralty plan:—English harbour, with view, No. 1,851; scale, $m = 30$ inches.

tions: ships should pick up the mooring buoy in Commissioners bay and heave in the chain till the large chain $1\frac{3}{4}$ in. comes in, shackle port bower cable to this, and veer alongside, take in the off fasts, run a hawser out to anchor on Magazine point, and heave in bower cable till all is taut; the necessary shore breast fasts are kept on the wharf.

There are no stores in the dockyard, except coal, which are stored in the old capstan store marked I. on the plan.

Supplies are scarce and dear.

Directions.—For a Sailing Vessel.—If intending to enter English harbour with the wind at east, steer boldly in under the heights a little to windward of fort Charlotte bluff (the east point of the entrance), and then stand towards it under all plain sail braced sharp up. Hug the shore close, giving the bluff a short berth, and luff up with the leading mark on before given. When the flagstaff in the dockyard comes in one with the end of fort Barclay, haul the courses up, and if the vessel has good way, she will most probably shoot round that fort before the baffling wind from the high land comes off from the northern shore. If she succeeds in shooting in, be prepared to bear up short round, and when in the centre of the channel, clew all up, as she will most probably have sufficient way to the anchorage off the dockyard. Should the vessel lose her way, and become unmanageable at the entrance, anchor immediately.

If the wind be at N.E. or E.N.E., prepare to anchor outside the narrows, having hawsers and a kedge ready to warp in. Should it blow strong, the gusts rush down the valleys with such violence, and the holding ground is so exceedingly bad, that a second anchor will most probably be required to bring up with; and if this is not done in time, the vessel may be exposed to much danger.

If not going farther than Freeman* bay, which is just within the entrance, keep to the wind, and shoot up as far as possible, to be able to drop the anchor in good holding ground, ready for warping up to the moorings laid down in the bay. Hawsers should be ready, if not in the boats. The wind generally slackens towards evening; and early in the morning a light land wind will enable a vessel to get out of the harbour without much difficulty.

For a Steamer.—From the entrance being so narrow, large steamers will find it extremely difficult to turn sufficiently quick and short round after passing fort Barclay, and it will be more convenient for them to anchor in Freeman bay; up to which place there is no difficulty. But, for

* From 1878 to 1884 several of H.M. Ships have reported a sunken buoy in Freeman's bay as a danger to navigation; in 1878 it was reported as awash; in 1884 it was 9 feet under water.

vessels drawing up 17 feet, a pilot may be necessary on a first visit, to avoid the 21 feet shoal between Barclay point and Charlotte reef.

The following instructions are from the remark books of the navigating officer of H.M.S.'s *Tourmaline*, 1878; *Tenedos*, 1880; and *Dido*, 1884. If not drawing over 20 feet water get the leading marks on (the patch of white on wall of Dow's garden on with whitewashed rock at north end of Freeman's bay or better still keep the whitewashed mark on the wall of garden a little open left of the other white mark till near Barclay point, then bring the marks in line), stop the engines some distance outside so as to have steerage way only when entering the harbour, the screw can then be used with helm hard a starboard, also using the head sails, and no difficulty will be experienced in turning ships head up the harbour, a few turns ahead or astern with the screw may be necessary; it will seldom be necessary to drop an anchor; in going up keep to the port side, turning up and taking in buoy in Commissioners bay as before directed; in dropping alongside the north wharf of yard a hawser may be necessary to the tree near the landing place under Clarence house.

FALMOUTH HARBOUR,* one mile westward of English harbour, affords excellent anchorage for a few vessels of large draught, there being 24 feet water in the centre; it is, however, never made use of, except by droghers. The harbour may be said to be divided into two parts; the north-eastern or inner being separated from the western by a spit, which extends from Blake islet more than half way across, where it terminates in a small patch, named Spit shoal, with a depth of only 13 feet on it. Between it and the foul ground off St. Ann point, the channel leading into the inner part is less than a cable wide, and which is still further narrowed for vessels of large draught by patches of 17 and 19 feet; sailing vessels have to warp through against the prevailing wind.

The heads of the inner parts of Falmouth and English harbours are only separated from each other by a narrow, low, sandy ridge, about one cable across.

The outer anchorage, in 4 fathoms water, for large vessels, is confined to a square space of about 2 cables each way; the inner, about a fathom deeper, is lessened in extent by several coral patches that have from 2 to 3 fathoms water on them; inside the patch that is awash, it is generally shoal with foul ground.

Directions.—Standing in for Falmouth harbour from the eastward, having passed Shirley heights, the entrance immediately shows

* See Admiralty plan :—Falmouth and English harbours, with views, No. 2,014; scale, $m = 8.8$ inches.

Note.—The shallow bay immediately west of fort Barclay named Willoughby bay on our chart is known locally as Snappers hole.

itself, and a vessel may then steer directly for it, until the east end of the fort on Blake islet comes in one with a remarkable house on the western slope of Monk hill, bearing N. $\frac{3}{4}$ W. This mark leads through the entrance, and having passed the Bishop shoal, which always shows itself, haul up and anchor as most convenient, according to the vessel's draught.

The middle ground between the two harbours is 321 feet high, and to seaward steep-to, near its summit there are the ruins of a fort.

Aspect.—From Falmouth harbour westward is the loftiest part of Antigua, and in many places the rugged irregular hills rise abruptly from the shore, particularly between that harbour and Old road bluff. In the immediate vicinity of the harbour are two conspicuous elevations which are frequently of great value to vessels navigating the north side of the island. The first is Monk hill, on the north side of the harbour, which may be readily distinguished by the fort and signal staff on its summit, the south-east side being 695 feet above the sea.

The other on the north-west side of the harbour, nearly $1\frac{1}{4}$ miles westward of Monk hill, is much larger, conical, thickly wooded, and rises to the height of 1,058 feet. When seen from the north-east and south-west its summit appears to terminate in a peak; but from the north-west and north, and points opposite, it forms two peaks, and is consequently sometimes named the Saddle hill; but as there is another of that name, it is appropriate to call it the Falmouth peak. In clear weather both of them may be seen from Barbuda 45 miles off. The hills westward of these are more lofty, but not so remarkable, with the exception of the highest in the island, named Boggy peak, which is 1,330 feet high, and slightly elevated above the adjoining range.

Old Road bluff, $2\frac{3}{4}$ miles westward of Falmouth, is a remarkable bold rounded headland, 135 feet high, steep-to, and easily recognized from the east or west, as it is then seen to stand out a short distance from under the high land within it. Nearly midway between it and Falmouth harbour is Ding-a-Ding nook, a small bay in which droghers find temporary shelter; the coast here may be approached within half a mile. On the west side of the bluff the shore turns suddenly to the northward for half a mile forming the east side of Carlisle bay.*

Old Road or Carlisle bay.*—A sandy beach sweeps round the head of this bay, and terminates on its west side in a bold rocky point on which there is an old fort; the village will be seen just to the northward of it. Immediately behind the beach, there is an extensive pond or

* See Admiralty chart:—Antigua, No. 918; scale, $m = 1.55$ inches.

lake in which there is good fishing with the seine, but it is private property. A spring of excellent water runs through the valley, but loses itself in the swampy ground at the head of the pond, some distance from the shore.

There is anchorage about midway between the Old road bluff and the fort in 4 or 5 fathoms water, a quarter of a mile or more from the shore. A long ground swell, however, generally sweeps in from the southward, causing a vessel to roll heavily; and landing is sometimes difficult, as the surf breaks a considerable distance from the shore.

Cade bay, Cade reef, and anchorages.—At $1\frac{1}{2}$ miles westward of Old road bluff, on a projecting rocky point, will be seen a small rounded eminence, called Goat head, 115 feet high, which is very remarkable, especially when seen from off the west end of the island. Between it and Carlisle bay are three small sandy beaches skirted by a coral ledge, which, from abreast Morris old mill (the only one seen on this part of the shore, Brooks mill, westward of it, being hidden by trees) to Goat hill, extends off upwards of a cable. From Goat head to the south-west end of the island, the shore is low and sandy, with swampy ground at the back; and it is still skirted by a flat coral ledge nearly dry, through which are one or two boat channels leading to good landing.

This part of the coast is also bordered with barrier reefs nearly dry in many places; and at the west end there is frequently a small sandy cay, which is occasionally heaped up or washed away by the violent action of the rollers.

This danger, named Cade reef, lies about a mile from the shore, and runs nearly parallel to it. Its east end lies south distant about three-quarters of a mile from Goat head, and extends thence to the westward 2 miles. Its outer edge is completely wall sided, and consequently very dangerous to approach during the night, as the lead will give no warning, and being under high land, no estimated distance can be depended upon. In the daytime it may generally be seen, and will be avoided by keeping the Governor's house on Dow hill open of Old road bluff.

Within this outer there is an inner danger, named Middle reef, lying nearly half a mile from the shore, and running also parallel to it; between it and the land there is excellent anchorage, off Cade bay, where there is a good watering place. The eastern or Goat head channel leading into it has not less than 24 feet water, and is easy of access, but too narrow to work out of; a vessel will, therefore, have to run out through the western passage, which is barred by a flat rocky ledge, on which there is not more than 21 feet water.

Directions.—Vessels running for the anchorage in Cade bay, or taking the inner route to St. John between the reefs and the shore (see page 94), should haul close round Old road bluff towards Morris old mill, passing Curtain bluff, which forms the eastern side of Morris bay, within a quarter of a mile. When abreast the mill, if the weather be clear overhead, discoloured water will be seen off the end of the reef, and the edge of the ledge which runs off Goat head, making clear a mid-channel course.

No leading mark can be given, so that for a stranger a pilot is necessary. The best anchorage for watering is with Morris old mill in line with Goat head and the large house on Harvey's estate,—which will be seen near the head of the valley under Boggy peak,—bearing N.E. by N. Round to under easy sail, so as to take as little sweep as possible. The above berth will place a vessel about midway between the reef and the shore.

If beating up for this anchorage from the westward,—which must be done outside the barrier, and with the caution before pointed out,—a rocky barren fork will be seen over Goat hill branching off to the southward from the main or highest ridge of hills, on which are three rather remarkable peaks, particularly the southern one, which is the lowest, 870 feet high, and named Cade peak. When these peaks are in one with Morris old mill a vessel will be to windward of the shoal ground off the east end of the reef, and may then stand to the northward until in mid-channel, when proceed as before directed.

As already observed, the anchorage off Cade bay must be left by the western channel; therefore having weighed, run down with the shore aboard, which may be done without fear, for the edge of the ledge which skirts it, is generally to be seen. Take care, however, not to open Morris old mill to the southward of Goat head, until the leading mark for the bar (viz. Frys mill in line with Crab point, bearing N. $\frac{1}{2}$ E.) comes nearly on, which will be known when Pearn's hill is on with Frys point.* The sails should then be trimmed, ready to haul sharply to the southward upon the leading mark. This is a point which requires great attention, so as not to get to leeward of the bar, which is dangerous; should it, however, be found that too great a sweep has been taken, and that the vessel is to leeward of the mark, a short tack should be immediately made. When Morris old mill comes open of Goat head, she will be outside the shoalest part of the bar, the channel over which is 2 cables wide; and when Dow hill house comes open of Old road bluff, bearing E. $\frac{1}{2}$ N., she may haul to the eastward.

* These are remarkable objects on the west side of the island.

Old fort point.—The south-west end of Antigua terminates at Old fort point, which is low and rocky; there are the ruins of a fort near the extremity, and the barrack will be seen a little within them. Close on the south side of the point is Johnson islet, a rock 18 feet above the sea, covered with brushwood; being, however, under the high land, these objects are not easily made out until on a N.W. or S.E. bearing.

WEST COAST of ANTIGUA, from Old fort point turns sharply to the northward for $2\frac{3}{4}$ miles to Reed point. In this space are three small, sandy, shallow bays named Picartes, Frys, and Morris, which are separated from each other by remarkable bold bluff headlands, about 100 feet in height. The high land of Antigua may be said to terminate at Morris bay; in the vicinity, however, there are several hills which are of great value to vessels navigating the west side of the island, and are conspicuous after passing Old fort point. Six of them are close together on the south side of Five island harbour.

The Saddle, 596 feet, and Flat top, 500 feet high, are the most eastern, and are at once distinguished by their names; Leonards, Pearn, and Mosquito hills are conical, with peaked summits thickly wooded; the two former are nearly the same height, 450 feet, the latter much lower. Mount Thomas or Round hill, 547 feet high, rises on the north side of Five island harbour, and makes as a large rounded wooded hill from all directions except the N.N.W., when it appears more peaked; three-quarters of a mile to the westward of it there is a narrow table ridge of moderate elevation, terminating near its east end in a small peak, 463 feet in height, named Table hill, which may be seen at a long distance, and is a valuable landmark.

Reed point lies at the foot of a wooded hill of moderate height, separated from the shore by a narrow neck of low swampy land, forming the south side of Mosquito cove, which is shallow, nearly half a mile deep, east and west, and a quarter of a mile wide from Reed point to the opposite shore under Mosquito hill. Pearn point, at the north-west extremity of the cove, is low and rocky.

All this part of the coast is extremely dangerous to approach, as it is fronted by a coral ledge, the outward edge of which is about 2 miles to the westward of Frys bay. The ledge is studded with rocky heads, having as little as 9 feet water on them, and three-quarters of a mile off Frys bay is one which is nearly awash.

There is, however, a good channel within the shoals for vessels of 14 feet draught, provided the trade wind is not too far to the northward, and they have a pilot.

The Five islands are very remarkable when seen from the northward or southward, but from the westward, being backed by high land, they are not easily made out, except the largest, which is 50 feet above the sea. The innermost island is a cable from the shore, with a channel of 7 feet water between. There are, in fact, but four islets, for the north-east part of the highest, which is called the fifth,—from its appearing disconnected at a certain distance,—is attached to its western end by a low rocky ledge. The two outer islands lie about half a mile to the westward of Pearn's point, and are steep to on their north and west sides. They are all, with the exception of the largest, low, small, rugged, rocky, and scantily clothed with brushwood. A channel having 15 feet water lies between the highest and the one eastward of it.

Directions for inner channel.—Approaching Johnson islet, give it a berth of a quarter of a mile, and when Sandy island comes in one with the east side of the highest of the Five islands bearing N. by W. $\frac{1}{4}$ W., haul up on this line until the Hawk's bill rock is just open of Pelican point, which mark will lead through the Five island channel. This passage, however, is only a cable wide; if, therefore, on nearing it, the wind should be found too scant to allow the vessel to lay through, she had better pass about $1\frac{1}{2}$ cables to leeward of the Five islands.

There is good anchorage along this shore in about 3 fathoms water, and good landing on the north side of Fry's bluff.

Vessels passing the south-west end of Antigua, outside the shoals, from the eastward, should not shut in the Governor's house on Dow hill with Old road bluff, until they have passed to the westward of the leading mark for the bar; they may then haul gradually to the north-west, taking care to keep Morris old mill open southward of Goat head E. $\frac{1}{4}$ N. until Hawk's bill is opened westward of Five islands N. by E. $\frac{3}{4}$ E., when they may haul up north; approaching the Irish bank, Great Sister in one with Ferris point, N.E. by N., or Sandy island light, N. by E., clears it to the westward, and when Mosquito hill comes on with Flat top hill you are northward of it. The soundings in this track are irregular, varying suddenly from 7 to 12 fathoms; in the night do not come within the depth of from 10 to 12 fathoms.

FIVE ISLAND HARBOUR, a bight north-eastward of the Five islands, $1\frac{1}{2}$ miles deep, and, although exposed to the rollers, is a secure anchorage with the prevailing winds, for vessels of 16 feet draught. The south-west point of the entrance is formed by a remarkable red cliff, about 30 feet high, a quarter of a mile to the north-eastward of Pearn's point, separating two sandy beaches; and thence across to Pelican point,

at the northern entrance, it is nearly a mile wide. In the inner part of the harbour is a remarkable small round islet, called Maiden island, with precipitous rocky sides, crowned with small trees, the tops of which are 90 feet above the sea.

The anchorage is obstructed by Cook shoal, a small rocky head with 9 feet water on it in the centre of the harbour, with Sandy island in one with Pelican point, and Maiden island E. by N. $\frac{1}{2}$ N. It is also obstructed at its entrance by the Pelican shoal of 15 feet water, which lies with Drew hill in one with Maiden island, and the Ship-stern islet just shut in with Ferris point. Pelican islet is small, rocky, 8 feet above the sea, 2 cables westward of Pelican point, and is foul on its east and west sides a cable off.

Directions.—Vessels of 16 feet draught approaching Five island harbour from the southward pass outside the shoals; if from the northward, within them. In the former case it will be better to beat in to the southward of the Pelican shoal, between it and the Five islands; a vessel may stand towards the latter without fear, as they are bold and steep-to, and towards the shoal no nearer than to bring Drew hill a little open southward of Maiden island being E. $\frac{1}{2}$ N. When Johnston islet is seen through the Five island channel she will be to the eastward of the shoal, and the board may be longer to the northward. When within the points of the entrance she may stand in to $1\frac{1}{2}$ cables from the shore, until the leading mark for the Cook shoal is nearly on. It will be better to pass to the northward of this shoal, therefore in standing towards it tack when Drew hill comes on with Maiden island. When within the shoal, proceed as far in as convenient, the lead being a sufficient guide.

Coming from the northward, the wind will be free, and when past Ferris point, keep the shore abroad to about 2 cables, and having rounded Pelican islet rocks, work into the anchorage. Leaving the harbour, run out with Seaforth bluff shut in with the south side of Maiden island, which leads northward of Cook and Pelican shoals, and southward of Hurst shoals.

The coast from Pelican point trends N.N.E. $1\frac{1}{4}$ miles to Ferris point,—a wooded bluff of moderate elevation. Thence it trends to the N.E., forming two sandy bays, named Galley and Goat hill, and terminating at Goat hill, which is remarkable, 176 feet above the sea, and crowned with a small fort with two signal posts, and which seen from the south-westward, open of Ferris point, is well-defined. Nearly a cable westward of Goat hill point there is a small flat-topped rocky islet, slightly wooded, called the Ship-stern, its west side having somewhat that appearance, being a bold perpendicular cliff about 60 feet high, with several large masses of

rock lying at its base, which are very remarkable when seen from the south-west or north-east.

Midway between Pelican and Ferris points, about $1\frac{1}{2}$ cables from the shore, is the Hawk's bill, a small barren black rocky islet, 25 feet high, steep and bold-to on its west side, which may be passed at the distance of a cable. Its west side being composed of soft sandstone, has been cut into by the action of the sea, forming a perpendicular cliff to nearly the top of the rock, where it overhangs, projecting out almost horizontally some feet. Its rounded summit terminates in a small knob, and, when seen clear of the land from N.N.E. or S.S.W., has the appearance of a hawk's bill, and cannot be mistaken.

From Goat hill the shore turns E.S.E. for $2\frac{1}{2}$ miles, forming the south side of the harbour and roadstead of St. John.

ST. JOHN HARBOUR,* at the head of which is situated the city of St. John, the capital of the island, is the chief commercial port in Antigua, from whence is finally shipped almost all the produce of the island, which is brought by droghers from the outports. The city lies on the side of a gentle acclivity, which at the upper part is about 80 feet above the sea, and contains about 18,700 inhabitants. From the offing its locality is at once pointed out by the cathedral, a large massive white structure, with two lofty towers, the vanes of which are 163 feet above the sea.

At the back of the city, there is a small wooded ridge of table land of moderate elevation with a distinct peak at either end; that to the south-east is 355 feet high and called Drew hill; the other at the north-west end, called Scot hill, is lower, and being more rounded not so well defined; they are both, however, serviceable landmarks.

The harbour is secure against all winds except hurricanes, but confined, and not at all convenient; for vessels of only 12 feet draught cannot come within three-quarters of a mile of the wharves, and those drawing over 14 feet are obliged to load in the roads; it is also exposed to the rollers, which frequently break over the jetties and inflict serious damage. The harbour is of irregular shape, nearly 2 miles in length from the bar to the head, and the inner part, between Week point and the west point of the Cove to the northward, is three-quarters of a mile wide. Here, however, it is divided by Rat islet, which is small, rugged, steep, and rocky; on its summit is a large building and lofty signal-staff, which are conspicuous objects; the wall surrounding the building is 137 feet above the sea. The

* See Admiralty chart :—Antigua, Sheet I., No. 2,065; scale, $m = 4$ inches.

islet is connected to the shore by a well-built causeway with a carriage road to the foot of the hill.

The north-west point of the harbour terminates in a small rocky bluff 37 feet high, on which is fort James, and the breadth of the entrance across hence to the opposite shore is half a mile. A little without the entrance a flat of sand runs along the whole front of the harbour, on which the greatest depth at low water is $15\frac{1}{2}$ feet, which is near the southern shore, and the channel is not half a cable wide. A small nun buoy lies on the north side of the channel.

Mail steamer buoy is red in 4 fathoms with Pillar rock, S.W. $\frac{1}{4}$ W., and St. James's bluff E. by S. $\frac{1}{2}$ S. The mail steamers now (1886) call here instead of at English harbour as formerly.

Coal.—A small supply of coal (under 500 tons) can be obtained at St. John.

St. John road lies immediately northward of the bar, and may be said to extend from Goat hill to the Great Sister, a space of 2 miles, but it is obstructed in the centre by the Warrington bank and the Middle ground. The outer part of the Warrington bank lies S.W. by W. $1\frac{1}{4}$ miles from the Great Sister, and N. $\frac{1}{2}$ W. one mile from Goat hill; it has one fathom water on its shoalest part, frequently breaks, and is extremely dangerous to approach; it is 4 cables in length, north and south, and nearly the same in breadth. The Middle ground is a circular bank, about 2 cables in diameter, with a depth of from 20 to 23 feet on it, lying south-east of the Warrington. The mark for the cut between these banks is, Table hill in one with fort Barrington on Goat hill S. by W. $\frac{1}{2}$ W.; but it should only be taken in a case of necessity. To the eastward of the Middle ground there is a clear ship channel 3 cables wide.

Anchorage.—There is good anchorage both to the north-east and south-east of these banks; that to the north-east is the best and most convenient, as boats will in general fetch in to the entrance of the harbour, and it is always used by vessels completing their cargoes outside.

The Sisters.—The Great Sister is a small rocky islet lying about three-quarters of a mile from the shore, and when seen from the north-west has the appearance of a wedge, with its thick end to the south-west, which is 36 feet high, bold and steep to within a cable's length to seaward. About a quarter of a mile E.N.E. of this islet are the Little Sisters, a small cluster of rocks only 4 or 5 feet above the sea.

Sandy island.—The approach to St. John harbour is also obstructed to the westward by a shallow bank from a half to three-quarters of a mile in extent, on the eastern side of which is a small cay called Sandy

island, clothed with stunted trees, the tops of which are 13 feet above the sea. It lies about W. $\frac{1}{2}$ N. $2\frac{1}{4}$ miles from Goat hill, and N.N.W. a little more than a mile from Hurst shoals. Weymouth reef, a dry ledge, extends W.S.W. 4 cables from it.

LIGHT.—A *fixed* white light, 56 feet above the sea, visible about 13 miles, is exhibited on Sandy island, from a black open wooden structure with red lantern. The light bearing S.S.W. clears the Diamond bank, and N. by E. the Hurst and Irish shoals.

The approach to the harbour from the northward is still more dangerous, for the shoals extend in that direction 3 miles from the shore.

Diamond bank, the outermost danger, half a mile long east and west, and 3 cables broad, is a coral ledge, and although nearly awash, seldom breaks; under favourable circumstances, however, the discoloured water may be seen from aloft, when near it. From the Great Sister it bears N. by W. $\frac{3}{4}$ W. nearly $2\frac{1}{2}$ miles; and from Boon point, which is well defined, N.W. by W. $\frac{1}{2}$ W. nearly $3\frac{1}{4}$ miles. It lies also near the west end of the dangerous coral reef which extends hence to the eastward almost continuously along the north shore of Antigua, at the distance of from one to 2 miles. The Diamond channel between these reefs, half a mile wide, has a depth of from $4\frac{1}{4}$ to 6 fathoms.

Bannister bank, nearly midway between the Diamond and the Great Sister, is nearly half a mile long east and west, and a quarter of a mile broad, with as little as 17 feet water on it. The mark for its south end is Boon mill in line with Hodge hill bearing E. $\frac{3}{4}$ S.

DIRECTIONS.—From the above description it will be seen that there are two channels to the road and harbour of St. John; the north-west and west; the latter is, however, but seldom used except by vessels leaving the harbour. Vessels bound in from the eastward generally pass the north end of the island, but which should not be approached within about 3 miles. Pilots are usually on the look-out in the offing near Parham.

Diamond channel.—Hutchinson's old mill, on the south side of St. John harbour, in line with Great Sister S. $\frac{1}{4}$ E. leads through in $4\frac{1}{2}$ fathoms water, and between the Bannister bank and the eastern reef in 4 fathoms. When Hodge hill comes on with Boon old mill E. $\frac{3}{4}$ S., keep away to pass about 2 cables westward of Great Sister; thence haul in for the anchorage. For this channel local knowledge is requisite.

North-West channel.—With the wind scant, and no pilot, it will be better to run westward of the Diamond bank, hauling to the southward when mount Thomas, a dark peak, is in line with fort Barrington

S. $\frac{3}{4}$ E. This is a long mark, and the fort is not easily made out. Keep this course, S. $\frac{3}{4}$ E., till Hodge hill is in one with Boon old mill E. $\frac{3}{4}$ S., when haul up for the anchorage.

Beating in, when standing towards Sandy island, keep Woods mill northward of Dry hill mill until within the cay. When standing towards the west side of the Warrington, keep Five islands open westward of Hawk's bill rock; the rock in one with the outer island leads half a cable from the bank. When between Great Sister and the Warrington, and standing towards the north side of the latter, Week point should not be opened of James bluff.

When standing to the north-eastward towards Bannister bank, Drew hill should be kept open to the westward of Great Sister, until the vessel is southward of it, or Hodge hill open south of Boon old mill. The latter cannot be mistaken, as on the north-east point of the island it is the only one and is without vanes; Hodge hill, on the north-east point of the island, is conspicuous, small, round, and 154 feet high; there is a remarkable tree or large bush on the summit.

Having passed within the Middle ground, which will be known when mount Thomas comes open eastward of the remarkable Pillar rock, bearing westward of S. by W., a vessel may anchor in 7 fathoms good holding ground, between it and the Great Sister.

The anchorage is exposed to westerly winds, which, however, seldom blow; when they do, and are accompanied by rollers, vessels labour heavily, and casualties have occurred.

Sandy Island channel.—Vessels bound to St. John from the southward should take this channel if of too great a draught for the inner passage. Approaching it, the dangerous steep-to shoals on the west side of the island must be borne in mind; the lead kept carefully going, and the ship's position assured by the change in bearing of the lighthouse and by bearings of prominent objects of Antigua, care being taken not to mistake Pearn hill for others near it. A possible set of the current should also be guarded against, which is uncertain. (*see page 104*).

Being about $2\frac{1}{2}$ miles westward of Old fort point, and with Hawk's bill open west of Five islands (*see page 94*), a North course may be steered, which leads half a mile outside the shoals. Do not bring Sandy island northward of N. by E. until Maiden island is in one with Pelican rock, when being abreast Hurst shoals she may haul into the channel, which is more than a mile wide.

Standing to the northward towards Sandy island take care not to open the north flagstaff at fort James northward of Goat hill E. $\frac{1}{4}$ N., a very

close mark,* as it leads within $1\frac{1}{2}$ cables of the reef in 4 fathoms water ; and approaching Hurst shoals keep Kid point well open of Ferris point till mount Thomas is in line with Hawk's bill, when you will be to the northward of them. Having passed to the eastward of Sandy island there is no danger until the Warrington bank is approached, when the directions for the North-west channel must be followed. If intending to anchor off the bar, or to enter the harbour, a vessel may do so by the West channel.

Ships passing westward of Sandy island should ensure their distance from it by carefully maintained bearings of the light, and by the use of the lead.

West Channel, between Warrington bank and Goat hill, is nearly three-quarters of a mile wide. Beating up this channel, it will be known when the vessel is near the Warrington by mount Thomas coming on with Goat hill, and standing towards it and the Middle ground, keep Drew hill open southward of fort James bluff. The shore side is bold and steep-to. There is anchorage off the bar in 6 fathoms, good holding ground, with mount Thomas in line with Pillar rock, and the cathedral touching the north extreme of Rat island ; the latter of these bearing E. by S. $\frac{3}{4}$ S. serves well also as a leading mark through the channel.

As the wind blows almost always out of St. John harbour, it can only be entered under the guidance of a pilot. To leave it is easy ; having weighed, run out with the south gable of the westernmost large store in the city (which has a red roof, and a flagstaff near it on the jetty) in one with the centre of the cathedral, E. by S., which leads southward of the buoy and over the bar in 15 feet, and when Yepton house comes open of Loblolly point S.S.E., haul to the N.W., and, the water having deepened, a course may be shaped through the West channel, or to the anchorage in the road. In the latter case, passing inside the Middle ground, keep mount Thomas well open eastward of Pillar rock, to avoid that bank ; and Table hill open westward of the rock, to clear the shoal ground northward of the bar.

Vessels bound to the eastward will gain by taking the Diamond channel, but they should be able to lay through.

NORTH COAST of ANTIGUA.—From fort James, at the entrance to St. John harbour, the shore trends N.N.E. $2\frac{1}{4}$ miles to Wetherell point, the west side of which forms a remarkable perpendicular dark cliff 100 feet high : the intervening space is low and swampy, with shoal water extending from half a mile to a mile off it. Close eastward there is a white cliff, and at the distance of a mile is Boon point, with the

* It should be borne in mind, that when Ship-stern rock comes in line with fort Barrington a vessel will be but one cable south of the shoal off Weymouth reef.

old mill near its extreme. The shore is here more elevated, and an irregular group of hills extends to the south-east for 2 miles; mount Pleasant, 456 feet high, is the loftiest, and distinguished by its flattened summit. On the south-west end of the range is a hill crowned with a clump of trees called the Pope's head, 366 feet high.

From Boon point, the extreme northern end of the island, the shore turns abruptly to the eastward, and forms a bight which terminates about 2 miles distant at Hodge point. This part of the shore is low, rocky, and skirted by sunken shoals, and there is only one spot, at nearly three-quarters of a mile westward of Hodge point, and named port Royal bay, where boats can effect a landing with safety; the hill just within this point becomes a useful object in the navigation of this extremely dangerous neighbourhood.

From Hodge point the coast takes a south-east direction $2\frac{1}{2}$ miles to fort Byham, Judge bay point being intermediate; on the former there is a flagstaff. The shore is low and foul; from the fort the shore becomes deeply indented, and forms two deep bights, the southern of which is Parham harbour.

Parham harbour is capable of admitting vessels drawing 13 feet, but the channels to it are so exceedingly narrow and intricate that the few vessels which load here receive their cargoes in the North sound. The town of Parham stands in the south-east corner of the bight, under a wooded hill 165 feet high, on the west side of which is the church, a conspicuous object from the offing. Parham was at one period the seat of government, and is still of some importance, being the place of transit for the greater part of the commerce of this end of Antigua.

The eastern side of the harbour is protected by a long, irregular, low, swampy neck of land, about a mile in length, terminating at North sound point in a small hill 60 feet high. From the east side of the neck, numerous small islets, rocks, and reefs, sweep round to the north-west, enclosing a large basin of water completely sheltered, called the North sound.

Great Bird island is the most remarkable of the islets which enclose North sound, and a valuable object to the pilots. It lies on the outer edge of the reef, $1\frac{1}{2}$ miles E.N.E. of North sound point, and about three-quarters of a mile northward of Guana island; it is of irregular form, its west side very low, but its eastern is a narrow strip of black barren rock, 3 cables long north and south, rising perpendicularly from the sea to the height of 110 feet, and may be seen from a long distance, the north end particularly, as it forms a bold headland. The north-east point of the dangerous coral ledge, which extends hence almost continuously along the

north side as far as the Diamond bank, bears from the bluff N. by W. $1\frac{1}{2}$ miles.

Three Fathoms bank lies N.E. a mile from Bird island reef, and about 2 miles N. by E. of Great Bird island. It is about three-quarters of a mile in length, N.N.W. and S.S.E., and 3 cables in breadth, with a depth of from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, over coral and white sand, with irregular soundings around.

Four Fathoms bank, N.E. $1\frac{1}{4}$ miles from Three fathoms bank, and N.N.E. 3 miles from Great Bird island. It is composed of small detached rocky heads, lying nearly in line, N.W. and S.E., for three-quarters of a mile, having a depth of $4\frac{1}{2}$ and $4\frac{3}{4}$ fathoms, and on which there is generally a heavy sea. Beating to the eastward, do not pass southward of these banks before the hill at the east end of Green island bears S. $\frac{1}{2}$ E.

Bird Island channel.—The entrance to this channel, which leads into North sound, is a mile northward of Great Bird island, and the few vessels that visit the sound enter by it; but it is so exceedingly dangerous to approach, narrow, and intricate, though deep enough for any ship, that no directions can be given, and it can only be navigated by the most experienced pilots. As the wind blows continually in, the passage out of the sound must be taken through a narrow channel between Maid and Long islands, in which there is a depth of 14 feet, but it should be buoyed beforehand.

Long island protects the north side of North sound and the east side of Parham sound. It is very irregular in shape, nearly a mile in length east and west, and three-quarters of a mile in breadth at its west end, decreasing towards the east, where it terminates in a point. The shores are low, but on its south-west end there are some trees 40 feet high. A cable northward of the north-west point is Moor islet, small, rocky, and 8 feet high; and half a mile eastward is Little Bird islet, of similar character, but only 20 feet high; both are useful objects in navigating the channels through the reefs.

Parham sound is about three-quarters of a mile in extent east and west, and half a mile north and south. It is capable of receiving a few vessels of large draught, is well sheltered, has good holding ground, and not exposed to the rollers. The Yam piece shoals, which are detached coral patches, extend nearly a mile from the west end of Long island, and shelter the anchorage from the north-east.

Directions.—Parham sound may be approached from several points between N.E. and N.W. through narrow openings in the Kettle bottom

shoals. The leading marks for them are given on the chart, but they are far too dangerous for a stranger, and it is only a well-experienced pilot that can make use of them. The largest and most generally used is the Horse channel, nearly 3 cables wide, between the Harney and the Horse-shoe shoals; it has, however, the disadvantage of being to leeward of the anchorage, for if the trade wind should be to the southward of East, a vessel will not fetch clear of Prickly pear, a small rocky islet partially wooded, about 15 feet high, N.E. by N. 4 cables from Hodge point.

The leading mark through Horse channel is Thibou mill just in sight eastward of Hodge hill, bearing S. $\frac{3}{4}$ W., which leads close to the westward of Horse-shoe shoal. Approaching it either from the eastward or westward a good offing must be kept; in the former case, do not bring Great Bird island to bear to the eastward of S.E. before the leading mark comes on. As the vessel draws in upon the mark, the north end of Great Bird will be seen coming on with Little Bird islet, which line leads over shoal water on the south side of the Horse-shoe shoal. Before it comes on, the discoloured water will be seen from aloft, which will enable a vessel to pass close to the shoal by the eye, and, being prepared, to luff close up round it.

In standing towards Prickly pear islet, do not open Moor islet northward of the highest part of Great Bird island; and on the opposite tack to the N.E., take care not to shut Little Bird in with Great Bird island, or to bring fort Byham flagstaff in one with a small table hill of moderate height, with a peak at its east end, a little southward of Parham, and bearing S. by E. $\frac{1}{2}$ E. from the fort. This latter mark leads westward of the Ward and Scott shoals, also through a very narrow cut to windward of the Horse-shoe, but it is difficult to be made out. Vessels drawing 17 feet should not anchor farther in to the southward, than to bring Martin and Blizzard mills in one. The former stands on the shore a little southward of High point, the latter on the upper ridge of hills above it.

Vessels leaving Parham sound for St. John will find it of advantage to pass within the shoals through Boon channel, which is quite straight and clear, and nearly three-quarters of a mile broad in its narrowest part except at its east end, where between the north-west point of Prickly pear edge and Silver rock shoal, it is only a quarter of a mile across. Run out of the sound, with fort Byham a little open to the eastward of the peaked hill before described, until Moor islet comes in one with the highest part of Great Bird island S.E. by E. $\frac{1}{2}$ E. Steer upon this line until Thibou mill is in one with Hodge hill, whence a W. $\frac{3}{4}$ S. course will lead through; the directions given for the Diamond channel (page 98) must then be

followed, taking care not to haul too much to the southward before fort James comes open westward of the Great Sister.

Guana and Belfast* bays.—Between Guana island and Indian town point, $2\frac{3}{4}$ miles E.S.E. from its east end, the shore is exceedingly irregular, and forms two deep bights, Guana bay to the north, and Belfast bay to the south. Both are well sheltered by the islets and numerous reefs to the eastward, and of sufficient depth for vessels of large draught; but the channels are far too intricate for them to navigate, particularly as the prevailing winds, which are here accompanied by a heavy short sea, make even an approach to this part very hazardous. They are frequented by droghers, which are sometimes exposed to accidents and long delays, as they cannot beat out, except under favourable circumstances. There is a boat channel between the bays and North sound, through the Narrows at the west end of Guana island.

Nonsuch bay.—Between Indian town and Man-of-War points, the shore again forms a deep bight, called Nonsuch bay, which is so completely protected by reefs nearly dry as to be a secure harbour, with a depth of from 5 to 8 fathoms; but it is equally difficult to navigate as those just described, and quite closed against sailing vessels of large draught. *See* page 85.

TIDES.—The rise of tide at Antigua sometimes amounts to 2 feet, but is generally less, and so uncertain in its periods as to be of little use to navigation. No regular tidal stream can be detected.

The current is equally variable in its movements, and the oldest pilots can give no certain account of either its strength or direction. During the period of the survey of these islands, between November and May, little or no current was met with between Antigua and Barbuda, although this is the period when the trade wind blows strongest. In June it has been found running strong to the westward, on the south side of Antigua, when at the same time there was little or none on the north side, and an eddy stream close inshore.

BARBUDA.

This island† is $13\frac{1}{2}$ miles long N.W. and S.E., and $7\frac{1}{2}$ miles broad, containing about 500 inhabitants, who are under the government of Antigua. It is but partially cultivated, being chiefly appropriated to the rearing of cattle, sheep, horses, and deer; indeed it may be termed the stock farm of Antigua, which it also supplies with corn, yams, sweet potatoes, lime,

* *See* Admiralty chart:—Antigua, No. 918; scale, $m = 1\cdot5$ inches.

† *See* Admiralty plan:—Barbuda, No. 1,997; scale, $m = 1\cdot3$ inches.

and wood. Cart-harness and saddlery are also manufactured from the skin of the deer, which are bred almost solely for that purpose.

The north, south, and west sides of the island are low, sandy, and scantily wooded, with nothing remarkable on them, except on the south side, where, about 2 miles from the south-west point, there is an old martello tower in a ruinous state near the beach, and a little to the eastward of it a remarkable clump of trees, both useful objects in approaching this side.

From Spanish point, the south-east end, the north side of which is a white cliff 35 feet high, the eastern shore of the island begins to rise, and about midway, over a space of 2 miles, it is composed of perpendicular cliffs 200 feet in height, and is the highest part of the island. On this side a dry broken coral ledge skirts the shore at the distance of about half a mile, upon which the sea breaks with great violence; and it is so steep that there is no bottom with 90 fathoms $1\frac{1}{2}$ miles outside it. In passing north of Barbuda it should be carefully remembered that the low north end, with its outlying reefs, extend fully 7 miles north of the Highland which will first be sighted, and without caution might be mistaken for the north end of the island.

A reef extends nearly $1\frac{1}{2}$ miles off the northern shore, and is also so steep that the depth is 30 fathoms within a mile of it; the extreme north point of the reef, however, always shows itself. At the north-west end of the island the ledge is composed of detached coral heads which extend out in that direction $2\frac{1}{2}$ miles, and do not break; here, however, the soundings give warning of approach, and a vessel in the night-time, when passing the west side of the island, should not come within the depth of 10 fathoms.

The west side is formed by a low, narrow sand-ridge scantily wooded, at the back of which is an extensive lagoon, carrying from 5 to 12 feet water. The entrance to it lies a short distance to the eastward of Billy point at the north-west end of the island, but it is obstructed by a bar of mud on which there were only $2\frac{1}{2}$ feet water. The bank on this side extends for a considerable distance to the westward, the 100 fathom line being 14 miles from the island; this coast is foul in places for 2 miles off shore; there is also a detached patch with 7 feet water on it, S.W. $\frac{1}{2}$ W. 9 cables from Tuson rock; vessels should not approach within the depth of 6 fathoms without caution.

The south side is by far the most dangerous, and must be approached with extreme caution, for the lead is of little use; indeed, in the night-time it should be avoided, if possible, altogether. From Spanish point a line of detached shoals extends nearly 7 miles in a S.W. by W. direction. The Palaster reef is nearly dry and always seen, but the other shoals have

a depth of from 8 to 16 feet on them, and seldom break. Under favourable circumstances, however, the discoloured water on them may be seen a quarter of a mile off. The westernmost shoals bear from River fort (the old Martello tower just noticed) South 6 miles, from Palmetto point S. by E. $\frac{3}{4}$ E., and from the little hill on Spanish point S.W. by W. $\frac{1}{4}$ W.; but the two latter objects are so far off and so low that they are barely seen from the deck. As before stated, this island is connected with Antigua by a bank varying in depth from 7 to 30 fathoms.

Supplies.—There are wells and large ponds of water in Barbuda, but it is brackish, and only fit for the animals; the inhabitants use what is caught in tanks. Other supplies are scarce and expensive, limes being the only fruit obtainable, beef more expensive than at Antigua, deer and guinea fowl as also pigeons are plentiful, but a guide is necessary for shooting, one can be had for 2s. a day.

Anchorage.—There is good anchorage on the west side of Barbuda, with the prevailing winds, with Cedar tree point bearing N. by E., and Palmetto point, the south-west extreme of the island S.E. $\frac{1}{2}$ S. in 6 fathoms water, about 3 miles off shore. Small vessels may approach much closer abreast Tuson rock, which is 2 feet above water, and lies a short distance from the beach, taking care to avoid the patch of 7 feet, before mentioned.

There is also excellent anchorage on the south side of the island, to the westward, and under the lee of the shoals, which shelter it with the wind as far to the southward as S.E. The best position for communicating with the island will be found about a mile from the shore, with the River fort bearing N. by E., and Palmetto point N.W. by W. $\frac{1}{2}$ W., in $5\frac{1}{2}$ fathoms. Be careful, however, when standing in, not to bring the fort to the northward of N. by E. until quite certain that the vessel is to the northward of the shoals. A bearing of the North shoulder of Highland will be a useful guide for leading up to sight the Martello tower.

Both this and the anchorage on the west side of the island are exposed to the rollers, which prevail between the months of November and May; but as they take the vessel in the stern, she is eased of the strain on her cable, and rides far more comfortably than at most of the anchorages about Antigua. At this period, however, landing is attended with great difficulty and risk, for should the boat be thrown ashore broadside on, the next wave would inevitably destroy her. From a short distance to the westward of the River fort as far as the south-east end of the island, the beach is skirted by small coral heads, with deep water between, through which the way must be picked to the landing; the clearest spot will be found abreast the fort.

Bank westward of Barbuda.—H.M.S. *Northampton*, in 1882, reports having obtained soundings in from 25 to 32 fathoms (with a doubtful cast of 14 fathoms), between St. Christopher and Barbuda, from a position in lat. $17^{\circ} 41' N.$, long. $62^{\circ} 20' W.$, to the southward, until the crater of St. Christopher bore W. $\frac{1}{4}$ S.

Echo Bank.—This bank, extending about one mile in an E. by N. and W. by S. direction and very narrow, was discovered in 1837 by the Netherlands brig *Echo*, and examined by the boat of that vessel. The bank was clearly defined by the pale green colour and muddy condition of the water over it, and also by the short sea upon it; numerous shoals of fish were also observed. The least water found upon Echo bank was a depth of 34 fathoms, near the eastern extremity, while over other parts of the bank the depths varied from 54 to 42 fathoms, stony bottom, and close round it no bottom was obtained in dark blue water at a depth of 98 fathoms. The position of the western part of this bank was determined to be lat. $21^{\circ} 12\frac{1}{2}' N.$, long. $58^{\circ} 42' W.$, which would place it about 270 miles N.E. of Barbuda island.*

South-eastward of Echo bank another small spot of light green water was observed.

* In February 1880, H.M.S. *Tenedos* passed over the reported position of this bank, but found no bottom at depths of 64 and 69 fathoms.

CHAPTER III.

THE LEEWARD LESSER ANTILLES ; AVES TO SOMBRERO
INCLUSIVE.

VARIATION in 1887.

Aves island	-	0° 45' W.		St. Bartholomew	-	1° 20' W.
St. Christopher	-	1° 10' W.		Sombrero	-	1° 25' W.

* AVES OR BIRD ISLET.

This islet is about three-quarters of a mile in length north and south, 3 cables in breadth, and 10 feet above the level of the sea, is of coral formation, and in 1855 contained deposits of guano about 2 feet under a surface of sand and loose coral, which probably ere now have been removed. It is skirted by a reef, except at the west side, where there is anchorage and landing. The reef on which the sea generally breaks extends about $1\frac{1}{2}$ cables from its north-west, north, and south ends.

The islet appears to rise from a bank of soundings of considerable extent, of which however we have no correct particulars. About 2 miles south of the south end H.M.S. *Mariner*, in 1855, passed over a shoal upon which there was apparently a depth of 5 fathoms. About half a mile from the breakers at the north end there are 6 fathoms water, at the same distance from the east side there are 5 fathoms, and at a mile from the southern extremity there are 9 fathoms.

This island is visited by fishermen from St. Eustatius island during March and April for the purpose of gathering eggs. No fresh water is to be found (unless, as is supposed, it may be obtained by digging about 200 yards from the shore). From careful observations the middle of the islet is in lat. $15^{\circ} 42' N.$, long. $63^{\circ} 37' 46'' W.$, the latter depending upon fort Christian, St. Thomas, being in long. $64^{\circ} 55' 40'' W.$ † The rise of tide is about 3 feet, the flood runs to the north-west. The rollers sometimes set in and pre-

* See Admiralty charts :—West India islands and Caribbean Sea, Sheet II., No. 762 ; West Indies, Sheet III., St. Domingo to Dominica, No. 2600 ; and plan of Aves island on chart No. 2600, scale, $m = 1.25$ inches.

† Lieut. G. B. Lawrence, R.N., 1850.

vent landing. The islet may be seen at the distance of about 8 miles in the day, but in a clear night it is not visible 2 miles.

There is anchorage with the middle of the islet bearing N.E., on a bottom of sand and rock, but care should be taken to pick out a sandy spot, which may be done by the eye. The water gradually shoals on the above bearing from 12 fathoms at the distance of a mile to $2\frac{1}{2}$ fathoms at about a quarter of a mile from the beach, but the water is rather deeper near the south end of the islet.

From H.M.S. *Tourmaline* in 1880, when approaching from the south-eastward, with the islet bearing N.N.W. distant 2 miles, bottom was observed, and a depth of 13 fathoms obtained, decreasing to 9 fathoms. Thence steering to the north-westward, when the hut on the islet bore N.N.E. to N.E. by N. there appeared to be good anchorage in about 10 fathoms, sand and coral, at $1\frac{1}{4}$ miles from the shore; but on running on to bring the hut to bear N.E. the soundings increased rapidly to 16 and 20 fathoms, and with the hut bearing N.E. by E. no bottom was obtained at 30 fathoms.

Captain Dennistoun is of opinion that the anchorage formerly recommended (with the middle of the islet bearing N.E.) is only available when within three-quarters of a mile of the shore, and that better anchorage in less water is found when the hut bears between N.N.E. and N.E. by N. The fishermen who resort to Aves islet stated that the anchorage in-shore or within half a mile of the landing place is not good, and that when a ground swell sets in the water breaks heavily. Occasionally, though not frequently, it is impossible to leave the islet for several days together during a ground swell, sometimes as much as three weeks.

During the visit of the *Tourmaline* there were three white men, a child, and two negroes, natives of Saba, on the islet, fishing and collecting eggs; they remain only while the fishing season lasts, from about the middle of January to the middle of April.

The sea birds usually visit the islet about the beginning of March, and the egg season ends at the same time as the fishing season.

There are no trees on the islet, and the vegetation is very scanty; the grass, however, is about six inches high. There is no appearance of guano now, but it is said that a vessel took some away about 16 or 18 years ago.

During the fishing season a schooner makes three voyages between Aves, St. Thomas, Saba, and St. Eustatius islands.

MONTSERRAT.

This island was discovered by Columbus on his second voyage, and so called by him from its resemblance to the mountain of the same name near

Barcelona, which is rugged, uneven, and exhibits many lofty peaks, as its name in the Spanish language implies. The first settlement on the island was formed by the English in 1632, and, with the exception of a short interval, it has remained a British colony attached to the government of Antigua. Its population in 1881 was 10,083. At the same period, the total value of imports was 25,598*l.*, and of exports 32,677*l.**

The island is of volcanic origin, and its lofty heights, clothed with wood to their summits, may when unclouded be seen at a distance of about 45 miles; the highest, Soufrière hill, being 3,002 feet above the sea. Its shape is nearly oval, 9 miles long, N.N.W. and S.S.E., and 5 miles broad, containing an area of about 37 square miles; and its shores are bold, steep, and free of danger. Its east and north-west sides are precipitous, but the south-east and west sides slope gradually to the sea, and are highly cultivated. The bank of soundings extends from the south side about a quarter of a mile, increasing in extent on both eastern and western shores to 3 miles at its north end.

Water.—Many springs of excellent water flow into the sea, but, from the surf, watering is attended with difficulty.

Anchorage.—The principal anchorage is off the town of Plymouth, near the south-west point of the island; but it is steep-to, there being 10 fathoms a little more than a cable from the beach, and deepening quickly to 20 fathoms, so that for a large vessel a better berth will be found north-west of the town, in 9 fathoms and about half a mile from the shore, with Bransby point in line with Redonda island N.N.W. $\frac{1}{2}$ W., and a water-mill near the beach in line with North George hill N.E. by E. $\frac{1}{2}$ E. The town is almost in ruins, and but few supplies can be obtained. Landing is difficult from the heavy surf on the beach, even in the finest weather. Small vessels may anchor on the west side of the island, and in Fox, Old road and Cars bays; there is no anchorage on the weather side. During the hurricane months a vessel should put to sea immediately on the approach of bad weather.

LIGHTS.—When the mail schooner is expected, a *fixed* light is shown from a staff on the beach in front of the town of Plymouth.

Tides.—It is high water, full and change, at Montserrat, at 6 h. 0 m. approx.; springs rise one foot 6 inches, neaps 6 inches, but they are irregular. Off the north and south points the western stream at times

* See Admiralty chart :—Montserrat island and Plymouth anchorage, No. 254; scale, $m = 2$ inches. Directions are from the survey by Staff-Commander J. Parsons, R.N., 1867.

runs 2 knots, the eastern being weak ; along its other shores it runs about half a knot.

REDONDA.

About N.W. 10 miles from Montserrat, is the small barren, rocky, uninhabited islet of Redonda, its rounded summit reaching 600 feet above the sea. Off its south-east end there is a small remarkable detached rock, called the Pinnacle. From about 3 miles N.N.W. of Redonda, a coral bank extends for about 7 miles in a northerly direction ; the least water on it is 21 fathoms.

NEVIS.

This lofty volcanic island* is somewhat circular, 7 miles in length north and south, $5\frac{3}{4}$ miles in breadth, and its area is about 20 square miles. It has been an English colony since 1628, and, like Montserrat, is under the government of Antigua. In 1881 its population amounted to 11,864. The imports and exports are now included with those of St. Kitts.

Columbus is said to have named this island after the mountain of Nieves, in Spain. The peak, with its crater, rises from the centre of the island to the height of 3,596 feet, but it is seldom visible ; there are, however, several other elevations, which being almost always unclouded become most useful landmarks. On the south side of the island, Saddle hill, 1,432 feet high, may be readily made out from its features, except from the E.S.E. and W.N.W., when the hummocks are in one ; the hill, however, from these points is equally conspicuous. On the east side of the island are two remarkable wooded peaks, standing on a fork of the mountain, 2,350 feet high.

On the north-west side Hurricane hill, 1,192 feet high, is easily known, being large and massive and terminating in a peak, and having at its base a small detached rounded hill, which forms a prominent bluff at the extreme north-west end of the island, 288 feet high, called Windy hill. With the exception of this point and the base of Saddle hill, the shores are low, and rise gradually to the interior, the plains and slopes being highly cultivated. Charlestown, the capital of the island, is situated on the west side, and has in front of it an excellent anchorage with the prevailing winds, although an open roadstead.

Bank.—Nevis, with St. Christopher and St. Eustatius, may be said to form another distinct group, as they are found to be on a band of soundings

* See Admiralty chart :—St. Christopher and Nevis islands, No. 487 ; scale, $m = 1.3$ inches. The directions for Nevis and St. Christopher are by Capt. E. Barnett, R.N.

detached entirely from the adjacent islands, or, at least, by channels of a greater depth than 200 fathoms. From the south side of Nevis, the bank extends S.S.E. $\frac{1}{2}$ E. $10\frac{1}{2}$ miles, and terminates abruptly in 17 fathoms, W. $\frac{1}{2}$ N. 7 miles from Redonda; it is here $2\frac{1}{2}$ miles broad, gradually increasing in dimensions as it approaches the island.

From the south end of the bank a remarkable coral ledge, about a mile in breadth, extends along its south-west edge for a distance of 5 miles, and has from 8 to 10 fathoms on it, with deeper water within. From the east and west sides of the island, soundings extend to the distance of $1\frac{1}{2}$ miles. At its north end it is only separated from St. Christopher by an intricate channel, called the Narrows. Except on the west side between fort Charles and Cades bay, the shore is fringed with a coral reef, and should not be approached within three-quarters of a mile, or the depth of 10 fathoms.

Water.—Several springs flow from the sides of the mountain, but in the dry season most of them are lost before reaching the shore. Jones river, which disembogues a short distance to the eastward of the village of Newcastle, at the north-east end of Nevis, is a considerable stream, but not of sufficient strength to turn a mill. Nelson spring (so called from his having made use of it when stationed here) falls into a pond on the west side of the island, near the beach, a little northward of the Lowland church, but the water is soft, and not used by the inhabitants except in case of need. On the western side of the mountain a thermal mineral spring takes its rise, which is conveyed through an excellent bath-house, about half a mile southward of Charles town. When first let into the bath its temperature is about 110° , and just before it enters the sea, near fort Charles, it is about 90° .

DIRECTIONS.—In approaching the anchorage off Charles town from the southward the lead must be quickly hove, particularly in the night, to avoid coming within 10 fathoms. In the daytime, having rounded the south end of Nevis, keep Frigate bay hill, at the south end of St. Christopher, clear of the main body of that island N. by W. $\frac{1}{4}$ W., having it to appear as almost separated from it, which it very nearly is. When Booby island, a remarkable small conical rocky islet, 126 feet high, in the narrows between Nevis and St. Christopher, comes open of Lowland point, N. by E. $\frac{3}{4}$ E., haul in upon this mark, which will lead just outside the ledge off fort Charles, and to an anchorage about half a mile off shore, in 5 fathoms water, abreast the flagstaff in the town.

Monkey shoals.—Vessels of large draught approaching the anchorage off Charles town from the north-west, must avoid the Monkey shoals, which are the only dangers on this side of Nevis, and lie N.W.

$4\frac{1}{4}$ miles from fort Charles, and S.W. $\frac{1}{2}$ S., about 2 miles from Nags head, the south end of St. Christopher.

These shoals form two small banks of coral and sand, on which there are 4 fathoms water; they lie on the edge of soundings, and occupy a space about half a mile long N.N.E. and S.S.W., are 2 cables broad, and the discoloured water over them may be seen at some distance from aloft. Paradise mill, at Nevis, in one with the old mill on Tower hill, bearing E. $\frac{3}{4}$ S. (the latter stands well up on the side of the mountain) leads close to the southward of them; Cades bay mill (the north-westernmost on the shore), in line with Spring hill mill (which stands conspicuously on the ridge connecting Hurricane hill with the mountain), E. $\frac{1}{2}$ S., leads to the northward; Lloyds staff at Charles town in line with Prospect hill mill (which stands on the top of the western ridge of low hills), S.E. $\frac{1}{2}$ E., leads to the westward; and the eastern fall of Nags head in line with St. Anthony western peak N.N.E. $\frac{1}{4}$ E. leads to the eastward. From the body of the shoals St. Eustatius is seen in one with Brimstone hill, and Mosquito bluff (the east extreme of St. Christopher), just clear over the low land to the northward of the Scotch bonnet. The soundings around are very irregular.

The Narrows is the name given to the channel between Windy hill at Nevis and Scotch bonnet head at St. Christopher. It is $1\frac{3}{4}$ miles wide, and navigable from the eastward for sailing vessels of 18 feet draught; but from the westward, against the prevailing winds, it can be only used safely by handy droghers, with the aid of local knowledge; for no good leading marks can be given, and the dangers are numerous.

Anchorage.—There is excellent anchorage in the Narrows, in 6 fathoms, over good holding ground, with Mosquito bluff just open of Scotch bonnet head, and Newcastle point at Nevis just open of Windy hill.

Directions.—The channel for vessels drawing 18 feet is between Booby island and St. Christopher, and to the north-west of the Cow rocks, a small cluster only 6 feet above the sea, lying south-west of Booby island and midway in the channel between Nevis and St. Christopher. The eastern entrance is obstructed by a dangerous bar of coral, which extends for upwards of $2\frac{1}{2}$ miles north-westward from the north end of Nevis. A second patch lies $1\frac{1}{2}$ miles N.N.E. of Mosquito bluff and about a mile from the nearest shore of St. Christopher.

The passage is between these shoals, on which the sea breaks in several places, and as the soundings give no warning, it is necessary to approach cautiously. For this purpose a vessel should keep an offing of at least 3 or 4 miles, and steer in with Nags head,—a remarkable peaked hill—in line with Mosquito bluff,—equally conspicuous, being a small perpendicular cliff

90 feet high, lying at the base of the lofty hills forming the south-east end of the island,—bearing S.W. $\frac{1}{2}$ W. ; when Lowland church is just open to the westward of Booby island S. by W., a vessel will be on the bar between the shoals, in 28 feet least water. Having crossed the bar run direct for Booby island ; pass 2 cables westward of it, and thence steer so as to pass to the north-westward of the Cow rocks, at about the same distance ; westward of them there is no danger to fear.

There is also a narrow channel for droghers, called the South channel, between Nevis and the inner end of the shoal extending from that island, by bringing Briscoe's old mill, on St. Christopher, open of the north side of Booby island, but from the eastward the mill is not easily made out.

ST. CHRISTOPHER.

This island more generally known by the name of St. Kitts, and by its primitive inhabitants called Liamuiga or the Fertile island, was discovered by Columbus in 1493, who was so charmed by its appearance, that he gave it his own christian name. It was one of the first of the settlements established by the English in the West Indies, who took possession of it in 1623, and in whose hands it remains, forming part of the government of Antigua. It contains about 44,000 acres, and in 1881 the total population was 29,137. In the year 1884 the total value of imports was 186,172*l.*, and of exports 189,280*l.*

Like Nevis, this island is of volcanic origin, the very remarkable peak of mount Misery (generally in the clouds) rising to the height of 4,314 feet. It is nearly 18 miles in length, N.W. and S.E., but so irregular in form as to vary considerably in breadth ; it possesses no harbour and but indifferent roadsteads, quite unsafe in the hurricane season. At about 4 miles from its south-east end, it is nearly divided into two parts by a low neck of sand, not a quarter of a mile across, and, consequently, at only a short distance it appears as two islands, and at a greater distance from the eastward or westward the irregular hills at the south-east end will appear as several detached islets.

The north-west end of the island is about 5 miles broad, and the centre part is occupied by a vast rugged mountain ridge, its lofty summit terminating in mount Misery ; at its base, on almost all sides, will be seen extensive and remarkable table lands, richly cultivated, making the island one of the most picturesque in the West Indies. At the south-east end of the ridge, at the back of the town of Basse-Terre, is a striking elevation called Great Monkey hill, its rounded wooded summit being 1,319 feet high, and at the foot of the western side of the mountain, close to the shore, is Brimstone hill, 779 feet high, equally conspicuous, and

easily distinguished by the extensive fortifications and signal staff which crown its summit.

The south-east end of the island, although much less elevated, has some very remarkable hills, which, as before observed, are extremely useful when navigating between the islands, as they are always visible. St. Anthony peaks are two massive hills which form the extreme south-east end, the loftiest being 1,188 feet high; the Nags head, 548 feet high, at the south point of the island, and the Sugar-loaf, 620 feet high, midway between the above, are all well-defined objects. The valleys which separate them are so low that from a distance, in certain positions, these hills appear as small islets.

The edge of soundings is distant only from a half to $2\frac{1}{2}$ miles from the shores of the island; the north-east shore is here and there skirted by a reef, which in places affords temporary shelter for boats and droghers. The bank which connects this island to St. Eustatius is from 4 to 6 miles broad, with a depth of from 15 to 25 fathoms over coral sand and rock.*

BASSE-TERRE, the capital of St. Christopher, is situated on the south-west side of the island, on the shore of a sandy bay nearly $1\frac{1}{2}$ miles in length, and about half a mile deep.

The best anchorage is off the centre of the town in 8 or 9 fathoms water, with the flagstaff of Old fort at the west end of the bay, bearing W. by N. No directions are necessary, for there is no danger whatever, but vessels of large draught when approaching it from Charles town (Nevis) must be careful to avoid the Monkey shoals.

A shallow bank skirts the beach at the distance of half a cable, and causes a heavy surf on the shore, especially when the rollers prevail; landing, therefore, at this period, is sometimes difficult. Water is obtained from a pipe at the custom house wharf,† without charge to ships of war.

LIGHTS.—A *fixed red* light is shown from a small wooden tower 37 feet high, on the beach, fronting the town of Basse-Terre; is visible about 5 miles. A red light is also shown from the end of the new wharf.

Old Road lies about 5 miles westward of Basse-Terre, and $2\frac{1}{2}$ miles eastward of Brimstone hill. A little eastward of the town there is a temporary anchorage in 9 or 10 fathoms water, stony ground, at the distance of a cable from the shore, abreast a rivulet of excellent water. This was formerly the general watering place, but the wharf having fallen into decay, the heavy surf exposes boats to so much risk, that vessels now prefer obtaining it at Basse-Terre, where, however, it must be purchased.

* See plans :—St. Eustatius island, and Orange anchorage, on Admiralty chart No. 487.

† A second wharf has been built to the southward of the old one, and of the same length, about 125 feet.

There is also a similar anchorage a little northward of the small fort, at the foot of Brimstone hill, with the flagstaff on the hill bearing E. $\frac{1}{2}$ N. and St. Ann church N. $\frac{1}{2}$ E.; a convenient spot for steamers to land troops or supplies.

Caution.—Neither of the above anchorages should be taken up by a sailing vessel, except in a case of great emergency, for the wind under the high land is so baffling and uncertain as to make it no easy matter to get away from the shore; and in passing to leeward of the island it will be prudent not to come within the distance of 3 miles, until the vessel is to the southward of the high land, to avoid being becalmed or exposed to the violent gusts which rush down unexpectedly through the ravines, and which she should be well prepared to meet.

In rounding the north end of St. Christopher in the night, to the westward, great caution must be observed not to come within the depth of 15 fathoms. Sandy point is foul for some distance, and very low; and being backed by high land, any estimated distance from it will be exceedingly doubtful.

In passing between St. Christopher and St. Eustatius,—unless the wind is well to the northward of East,—it will always be better to give the former a wide berth, in order to keep the breeze. A vessel will seldom meet with any adverse current here, and she will have no difficulty in beating up to Basse-Terre.

Deep bay, at the north end of St. Christopher, affords safe anchorage to droghers, being protected by a reef nearly dry, extending about three-quarters of a mile from the shore, with shallow ground a short distance outside it; this part of the island therefore should not be approached within the distance of 2 miles.

ST. EUSTATIUS.

This island,* called more commonly Statia, is lofty and volcanic, $4\frac{1}{4}$ miles in length N.W. and S.E., and from one to 2 miles in breadth, the south-east end being the broadest. It has been almost uninterruptedly a Dutch colony since 1600, but the English language is spoken. Formerly it was a place of some importance, being a free port; it has now scarcely any trade, and nothing is to be seen of its previous greatness but the ruins of extensive warehouses, which lie scattered on the beach, and attract attention on first landing.

The island produces yams in abundance, which are sent to the neighbouring islands and Surinam; sugar is also grown in small quantities. The

* From the survey and remarks of Lieut. G. B. Lawrance, R.N., 1851. See Admiralty chart, No. 487; scale, $m = 1\cdot3$ inches.

imports are merely for home consumption, and chiefly obtained from St. Thomas. The Lieutenant-Governor has also Saba under his control but subject to the government of St. Martin. The population in 1872 was 2,884.

The island when viewed at a distance from the north-east or south-west appears as two distinct islands. The northern part is broken up into rugged hills from 500 to 900 feet high, which run in a transverse direction across the island and terminate abruptly on the shore; the southern portion is occupied by the volcanic mountain, the summit of which reaches the height of 1,950 feet, but is seldom visible; its sides slope gradually down to the sea, and would be very remarkable for their extreme regularity of outline were they not broken by a bold white cliff on the south side, called the White wall, 900 feet high. The valley between the high parts of the island is highly cultivated.

Orange town, the only town in St. Eustatius, is on the west or lee side of the island, partly on the beach, and partly on the cliffs, about 130 feet high, which overlook it; the former called the Lower, the latter the Upper town, communicate by a steep road cut out of the cliff. Fort Orange stands on a cliff in front of the town facing the sea; and on other commanding positions, especially on Signal hill, are the ruins of former defensive works and batteries. The cliffs on which the Upper town stands are composed of terras, a white argillaceous earth, which is found to be an excellent cement, either for exposure to the atmosphere, or for subaqueous works.

The only safe landing place is on the beach under the town, and here the surf is so heavy that the boat must be veered in from an anchor with a long scope of cable. There are two springs at Orange town, one close to the beach in the Lower town, but the water is not good, and the inhabitants use that which is caught in tanks, during the rainy season.

Anchorage.*—The approach to the anchorage off Orange town is quite safe, and it may be taken up at any time during night or day. The wind scarcely ever varies to the northward of N.E. or to the southward of East, except in the hurricane season, and the only danger to be avoided is a rock nearly awash, lying $1\frac{1}{2}$ cables from the shore at the south-west end of the island between the White wall and the town.

The best anchorage is $3\frac{1}{2}$ cables from the shore, in 10 fathoms, sand, with the church and Round hill in one E. by N. $\frac{1}{2}$ N., and the south-west extreme of the island in one with Brimstone hill (St. Christopher) S.E. $\frac{1}{2}$ E.

The northern part of St. Eustatius is bold, and may be rounded at the distance of a cable; but breakers extend from the south-east side to the

* See plan on Admiralty chart, No. 487; scale, $m = 1.28$ inches.

distance of 2 cables, and in coming from either quarter it will be better to keep half a mile from the shore, to avoid the baffling winds under the high land.

The edge of the bank lies close to the south side of the island; $1\frac{1}{2}$ miles from the north side; $2\frac{1}{2}$ miles from the north-east side; and 2 miles from the west side, where there is a depth of 37 fathoms. There are a few rocky spots which should be avoided, but generally the bottom is sandy, and good holding ground.

SABA.

This small but remarkable island* is also a Dutch possession, it rises 2,820 feet perpendicularly from the sea, but its summit is generally in the clouds. It is nearly round in form, $2\frac{1}{4}$ miles in diameter, bold and steep-to, The 100-fathoms line of soundings is about half a mile from its west side, and only 3 cables from its east side. The island is a mass of rugged mountains, with deep and precipitous ravines, through and over which are only footpaths from house to house.

The principal village is situated in what the inhabitants call the Bottom, a small valley 960 feet above the sea, and is only visible when Ladder point, the south-west point of the island, bears N. by W. The population in 1872 was 1,883. The only commerce is in poultry and vegetables, particularly sweet potatoes, which are raised in great abundance, and exported to the neighbouring islands. The islanders speak the English language, and are excellent ship-builders, and their boats and small craft being famed all over the Windward islands, their model is generally adopted.

The principal landing place, called the South side landing, is about 4 cables eastward of Ladder point, and is merely a little rocky cove on the coast, at the foot of a deep ravine, through which a pathway leads up to the village.

There is another landing about three-quarters of a mile northward of Ladder point, called Ladder landing from its being at the foot of a pathway traced out of the rugged precipice, which rises almost perpendicularly out of the sea. In general a heavy surf breaks all along the shore, and renders landing extremely difficult and often dangerous.

A landing may be effected with the prevailing winds, when moderate about one-third of a mile to the southward of Torrens point, the north-west extreme of Saba. This is the principal boat-building spot. There is a well near it, but the water, although drinkable, is not good; the inhabitants chiefly depend on rain water, caught in tanks. Vessels might obtain a supply from the well, but it would be attended with very great difficulty

* From the survey and remarks of Lieut. G. B. Lawrance, R.N., 1851. See plan on Admiralty chart, No. 487.

and risk. Fire-wood can be purchased, but it is requisite to bespeak it, and agree to have it brought down to one of the landings.

At Ladder point, among the boulders close to the water's edge, there is a thermal mineral spring, of sufficient temperature, it is said, to boil an egg; but it is so small that it is only to be found by digging away the loose earth and sand around it.

Anchorage.—There are two positions off Saba island where anchorage may be obtained, but neither of them are safe for large sailing vessels, from the difficulty of getting away from under the high land. One is off the South side landing, but it is, however, only fit for small fore-and-aft rigged vessels or steamers, that can be easily handled. The other is between Ladder landing and Torrens point north of it. The only difficulty that will be found here is in having to contend with the baffling winds which are sure to occur, unless the wind is as far to the northward as N.E. by N., which only happens occasionally during the winter months.

Directions.—Should necessity compel a sailing vessel to take this anchorage, it had better be approached from the northward. After rounding the Diamond rock (which is a remarkable, small, barren, rocky islet, lying off Torrens point, rising perpendicularly from the sea to the height of 80 feet, and very bold, to a cable's length), and approach the anchorage under easy sail. When the north point of Saba is shut in with Torrens point, and just before the Pilot rock (which is 6 feet above water, and lies between the Diamond and Torrens point,) comes on with the western peak of the island of St. Martin, bearing N.N.E., a vessel may anchor in 12 or 15 fathoms, sandy ground, about 2 cables off shore.

The bank here is very steep, and it will be prudent to lay out a kedge with a stout hawser to the westward, to prevent the vessel from swinging in-shore by the eddying gusts from the mountain, and which will be found convenient to haul off by when getting under way.

There is a clear deep channel between the Diamond and Torrens point, and it may be taken from the eastward, provided the wind is not to the eastward of E.N.E. In this case keep the Diamond close aboard, to avoid a small rock awash just outside the Pilot. As nothing, however, is to be gained by taking this channel, it will be better to pass outside, westward of the Diamond.

There is no perceptible tide at Saba island, but sometimes a feeble southerly stream sets along the western shore.

Saba bank forms nearly a parallelogram, its longest sides lying E.N.E. and W.S.W. about 32 miles, and its shortest about N.W. by N. and S.E. by S. 20 miles. Its nearest part is $2\frac{3}{4}$ miles south-west of Saba island. The east extreme of the bank bears S. by E. distant about 12 miles from Saba, and the north end W. by N. 8 miles.

The eastern edge of the Saba bank is fringed with a remarkable narrow ledge of living coral, sand, and rock, which is nearly 30 miles in length, varying in depth from 6 to 10 fathoms; when on this part the bottom is distinctly seen. It commences about S.W. 4 miles from Saba island, and trends thence to the S.S.E. for 11 miles, with a breadth of from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles; it then turns S.S.W. for 8 miles, and is from one to 2 miles broad, and terminates W. by S. 12 miles farther on, where it is merely a ridge of 9 fathoms not half a mile broad. To the westward, within this ledge, with the exception of a few small coral patches of 9 and 10 fathoms towards the southern edge, the bottom is clear white coral sand, with a depth of from 12 to 15 and 20 fathoms, gradually increasing to the edge, but terminating abruptly in 30 fathoms. The bottom can be distinctly seen under a depth of 10 fathoms.

On the northern edge of the bank there is excellent fishing ground, but the Saba fishermen have frequently found the barracouta caught here, and on the bank between St. Christopher and St. Eustatius, *poisonous*.

Tides.—There appears to be no tide on the Saba bank, and very little current was observed during the survey, which was made in the winter months.

ST. BARTHOLOMEW.

This island* (generally called St. Barts) forms, with St. Martin, Anguilla, and Dog, another distinct group, lying upon the western edge of a separate flat bank of soundings of considerable extent, composed chiefly of shells, gray and white sand, with a little coral and crust.† From St. Bartholomew the bank extends E.S.E. 27 miles, where it terminates in a small tongue or spit, separated from the main bank by a remarkable narrow vein of deep water, about 13 miles from the east or tip end; and which end is only about 13 miles westward of the Antigua bank. East of the island the edge of the bank lies 14 miles off; to the north-east 8 miles, and to the south-west, 6 miles.

From Scrub island, at the north-east end of Anguilla, this bank extends 25 miles eastward, and terminates in a point; thence the edge runs almost in a straight line W. by N., until it reaches within $4\frac{1}{2}$ miles north of the island; it then turns abruptly to the N.N.W. for a distance of 15 miles, forming a deep bight, and ends in a tongue 3 miles broad, in lat. $18^{\circ} 33' N$.

* See Admiralty chart:—Anguilla, St. Martin, and St. Bartholomew islands, No. 2,038, scale, $m = 0.42$ of an inch; and plans of ports, No. 2,079, scale, $m = 2, 4$, and 6 inches.

† The term crust has been given to a very small, thin, flat marine plant, of somewhat circular outline, with corrugated edges, incrustated with hard lime, having something the appearance of a white flat stone, and found in almost all parts of this sea.

(only 3 miles to the southward of the latitude of Sombbrero, and 24 miles E. by S. of that island); whence it recurves to the south-west, and encircles the group on the west and south-west sides, at the distance of from one to 6 miles.

St. Bartholomew is a French possession, and contains about 4,000 inhabitants. It was first colonized by the French in 1648, and after frequent changes came into the hands of the Swedes in 1784, by whom it was ceded to the French in 1878. Its exports were trivial, the commerce, small as it was, depending chiefly on its being a free port before it was ceded to the French, in 1883 the commerce of the island was almost nil. It is of irregular shape, and indented by numerous small bays, separated from each other by bold, rocky headlands, and formed of irregular hills of moderate elevation, the highest being only 992 feet in height. Its length, from east to west, is about 5 miles; and its breadth varies from about one to 2 miles. In most parts it is barren and sterile, the numerous little valleys, however are well cultivated, and produce abundance of vegetables: firewood is scarce, and water has to be purchased.

This island may be recognized from the others of the group by three remarkable hills near its east end, of nearly the same elevation, and forming a triangle; therefore, when seen at a distance, on the bearings of S.S.W., W. by S., and N.W. by W., and on the opposite points, they appear as only two hills, the eastern being 992 feet high, and more peaked than the others, the southern 861 feet, and the northern 821 feet, the latter is distinguished by being more rounded. The north and east sides of the island are fringed, to a short distance from the shore, by a coral reef which always shows itself; and off its sides are several small rocky islets, which it will be necessary to describe, as they interfere with the navigation of the channels, especially those on the south side of the island.

Coco, the southernmost of the islets off the south-east side of St. Bartholomew, lies South, about half a mile from the bold high bluff which forms the east side of Grande Saline bay. It is a narrow, rocky islet, slightly wooded on its summit, about a quarter of a mile in length north and south, and has a small rock nearly connected to its north end; the islet is steep-to on all sides, particularly at its south end, but it is not advisable to pass in-shore of it.

The Roques, or little Turtle rocks, are two very small rocky heads lying close together, three-quarters of a mile to the eastward of Coco island. They are only 3 or 4 feet above the sea, and although bold and steep-to, are dangerous in the night, being nearly $1\frac{1}{2}$ miles off-shore. In-

shore of them is the Fournis reef, with a deep channel between, but it will always be better to pass to the south-east of them.

The Tortue is a small flat-topped rocky islet, lying a quarter of a mile from the north-east point of the island, to which it is connected by a ledge of rocks, dry in places. A quarter of a mile to the north-east of this islet are the Grenadiers, a small rocky ledge only 2 or 3 feet above water, on which the sea breaks heavily; it is steep-to on the north-east side.

Toc Vers, the northern and outermost of these islets, is a small pointed rock, lying about $1\frac{1}{2}$ miles from the northern shore of the island. When seen from the east or west, its north point resembles a lofty pillar, standing close by the side of the perpendicular cliff, which is about 120 feet high and very remarkable. It is steep-to on its north and east sides.

Fregatte and Goat are two islands of considerable elevation, clothed with grass and low brushwood, and readily distinguished. The channels between these islets and St. Bartholomew are clear, and about a quarter of a mile wide, but the sea is generally so heavy that they should not be attempted except in a case of necessity.

The Sugar-loaf, lying near the south-west side of St. Bartholomew, is a remarkable, small, barren, rocky islet, having the exact form its name imports when seen from any direction, and although similar in appearance to the Grouper rock, its position and greater elevation readily point it out. It lies nearly West $1\frac{1}{2}$ miles from Gustaf, and is an excellent guide for the entrance of that harbour, which from a distance is not easily made out. It is 180 feet high, bold and steep-to, except on the north side, from whence a narrow ledge of dry and sunken rocks extends off for 2 cables; at its extremity there are two small rocks about 4 feet above water, and steep-to outside.

GUSTAF HARBOUR.*—Gustaf or Gustavia, on the south-west side of St. Bartholomew, $1\frac{1}{2}$ miles north-west of Nègre point, the south extreme of the island, is the seat of government, represented by a Resident representing the Governor of Guadalupe. The inner harbour, named the Carénage, is in the south-east part of the bay, and on the shores of which the town is built; but it will only admit vessels of 5 or 6 feet draught. The outer harbour is a commodious and safe anchorage with the prevailing winds, for a few vessels drawing not over 17 feet, but being exposed to the south and west it is not secure in the hurricane season. Vessels of larger draught will find anchorage under the south-west side of the island between the Syndare islets and the west end.

* See plan :—Gustaf harbour, scale $m = 6$ inches, on Admiralty chart No. 2,079.

The Carénage is nearly half a mile long, 200 yards wide at its inner end, and 130 at the narrowest part of the entrance. It is bounded on its south-west side by a narrow rocky ridge, terminating at the entrance in a bold headland 136 feet high, on the summit of which is fort Oscar, now (1883) in ruins, mounting 4 guns. On its north-east side it is backed by a ridge of more lofty wooded hills, 260 feet high, terminating at the entrance in a precipitous acclivity, 170 feet high, crowned by fort Gustaf, which, overlooking the ridge on the opposite side, commands the harbour, and serves to point out the locality of the harbour to a stranger coming from the southward, for the town, a portion of which has lately been destroyed by fire, is quite out of sight. The outer harbour is confined to a square space of about 3 cables in extent, and may be entered from the South or West.

The South Channel, 2 cables in width and having 6 fathoms water, lies between the Saintes and the Syndare islets: the former are three small, low, rocky islets, extending N.N.W. and S.S.E. 2 cables, and not quite that distance from the shore; outside they are bold and steep-to, but in-shore a ledge extends towards fort Oscar bluff, leaving a passage not half a cable wide. The two Syndare islets, lying north and south of each other, are barren, rugged, and separated by a coral ledge, about half a cable long; the northern islet is 98 feet high, and a ledge extends for about 50 yards from its north and east sides, and is easily seen by the discoloured water; a ledge also runs out half a cable from the south-east end of the southern islet, and upon it are two small rocky islets; the outer one rises from the edge of the ledge, and is bold and steep-to.

The West Channel, formed between the Syndare and the shore, is about $3\frac{1}{2}$ cables wide, and the only danger in it is the shallow ground before noticed, off the north end of the Syndare.

Directions.—Vessels bound to Gustaf from the eastward, or intending to proceed to the southward of St. Bartholomew, should not bring the east end of the island to bear North before they have opened out the Sugar-loaf to the southward of Nègre point, to avoid the Roques. With the prevailing wind the South channel is the easiest to enter. In taking this channel, pass close westward of the Saintes, and anchor according to draught.

Should the wind be at East, if well manœuvred, the vessel may fetch into a berth. Should it be to the northward of East it becomes so variable and unsteady, and rushes down with such violence, that the greatest attention is requisite to keep the vessel well under command to ensure staying. If the Syndare is weathered, she may stand boldly towards the shore, as far as is necessary to enable her to fetch into a berth, according to her

draught. If not, there is room to make a short tack to the eastward, but a stranger without a pilot had better avoid this risk by using the West channel.

In taking the West channel, if coming from the eastward, the vessel may pass either outside the Sugar-loaf, or between it and the Syndare islets; if the latter route is taken, haul close round the west side of the Whale rock—which is small, dangerous, awash, and steep-to, lying nearly 2 cables westward of the Syndare—and tack when necessary under the shore, which is free of danger. There is a clear and deep channel between the Whale and the Syndare islets, but the wind is so uncertain that it will be better to pass outside. A pilot is always at hand. The rise and fall of tide depends on the wind.

Grande Saline bay, to the north-west of Coco islet, affords temporary anchorage for small vessels. At the bottom of this bay are great salt marshes, the working of which has been partially abandoned. Thence to the south-west side of St. Bartholomew the shore is bold and steep-to, and there is no danger but that described.

Colombier bay, at the north-west end of St. Bartholomew, also affords shelter and tolerable anchorage; there is a patch of 4 fathoms near mid-entrance. In the bight of St. Jean bay on the north side of the island there is also a narrow cut through the reef which will admit coasters.

Channel between St. Bartholomew and St. Martin.—The Grouper rocks and Table rock may be said to form the eastern side of the main channel between St. Bartholomew and St. Martin, and which is 5 miles across to the islets or rocks on the east side of St. Martin, and has 12 to 14 fathoms water. It may be freely navigated by day, but is dangerous at night, as the soundings are deep and regular up to the sides of the rocks, and the lead will give no warning. The following are the islets on either side:—

Beef Barrel is a small square black rock, only 14 feet above the sea, lying West nearly $1\frac{1}{2}$ miles from Colombier point, the north-west end of St. Bartholomew, with a clear channel between it and the 4-fathom patch about half a mile off Colombier bay. It is bold and steep-to on all sides but the north-west, which is foul to the distance of a cable.

Boulanger island, lying North $1\frac{1}{2}$ miles from Colombier point, is a small, barren, rugged, rocky islet about 50 feet high; rising abruptly from the sea on all sides. About 2 cables eastward of it will be seen a remarkable pillar shaped rock, nearly of the same height, which, from its resemblance to a vessel under sail, is called the Sail rock. They are bold and steep-to, and cannot be mistaken.

Fourche or Five islands is the largest and loftiest in the channel between St. Bartholomew and St. Martin. It is elbow shaped, the northern arm three-quarters of a mile long east and west, the eastern arm half a mile north and south, and it is about two cables broad. The latter name is given to it in consequence of its having five small peaked hills, which at a certain distance have somewhat the appearance of being so many small islets. The two western hills are 349 feet high, the others a little lower, therefore at a still further distance they will be seen as two islands. At the east, and also at the west end, there is a small detached rock lying a short distance from the shore, with a ledge nearly dry between. At about a cable westward of the south point there is also a dangerous small rock, which just shows itself above water; with these exceptions it is bold and steep-to.

Anchorage.—There is anchorage off the south-west side of Fourche, where a vessel will ride with ease and safety during the prevailing winds; but it will be prudent for a sailing vessel not to go farther into the bight than about midway between the ends of the island, with the south point bearing E. by S.; closer in, the wind becomes so baffling and unsteady, that, in weighing, casting the right way cannot be depended on, and there is no room to manœuvre. A vessel of large draught, in case of necessity, wishing to repair damages, may haul in close under the eastern arm, passing westward of the small rock just noticed. There is good landing in the sandy bay at the north-east corner.

Table rock lies N.W. $1\frac{1}{4}$ miles from Fourche island, with a clear passage between. This is a small rocky islet, nearly barren, and when seen from the north or south has somewhat the appearance of a shoe, with the heel to the westward, where it is 25 feet high; it is clear all round, and may be approached on its west side within a quarter of a mile.

The Great Grouper is a rocky barren islet, almost circular in form, about $1\frac{1}{2}$ cables in diameter, and very much resembling in appearance the Sugar-loaf and the Mollibeday rock. It rises abruptly on all sides, and terminates in a rounded summit, 150 feet above the sea. A coral ledge of dry and sunken rocks extends to the distance of a cable from its south side, leaving a narrow vein of deep water between it and the little Groupers; from all other quarters it may be approached within half a mile; and the channel between it and Table rock may be navigated freely.

The Little Groupers form a cluster of small, detached, black, barren rocks, the southernmost lying S.S.W. half a mile from the great Grouper. This and the northernmost rock are about 15 feet high, but the intermediate ones are much lower; they are steep-to on all sides.

The Hen and Chicks are the outermost rocks on the west side of the channel between St. Bartholomew and St. Martin, and lie E. by N. 2 miles from Blanche point, the south-east extreme of St. Martin, and N.W. by W. $\frac{3}{4}$ W., 5 miles from Table rock. They are a cluster of small rocks, extending in a north-east and south-west direction nearly a quarter of a mile; the south-westernmost is 15 feet high, but the others are not more than 4 feet, and they are steep-to on all sides.

Guano cay lies N.E. by E. $\frac{1}{2}$ E. about $1\frac{1}{2}$ miles from Blanche point, N.W. $\frac{1}{2}$ N. three-quarters of a mile from the Hen and Chicks, and nearly half a mile from the nearest shore. This is a small rocky islet rising almost abruptly from the sea to the height of 100 feet, and is slightly wooded. It is bold-to on its south-west and south-east sides, but nearly half a mile to the north-east of it there are two small rocks just above water, over which the sea breaks heavily.

The Mollibeday rock is similar in form and appearance to Guano cay, and its rocky sides, partially wooded, rise abruptly to 100 feet above the sea. It is foul on its south-east side to the distance of half a mile; and E.S.E. a quarter of a mile from it, there is a small ledge of rocks a little above the surface of the water, which always show themselves by the breakers.

There is a clear channel, three-quarters of a mile wide, between the Mollibeday and the Hen and Chicks, and also between it and Guano cay; but they should only be used in case of necessity, especially the latter, which is about half a mile wide.

ST. MARTIN.

The general outline of this island may be said to form an equilateral triangle, with its sides facing East, S.W., and N.W., each about $7\frac{1}{2}$ miles in length; but it is deeply indented by bays and creeks, some of which afford good anchorage. It contains an area of about 30 square miles, and possesses several valuable salt ponds, and the valleys and small plains are highly cultivated. The north-west part of the island, with a population of about 4,000, is governed by the French. The other portion is in the hands of the Dutch, and in 1872 contained 2,820 inhabitants, most of whom speak the English language.

This island is of moderate elevation; the loftiest table ridge, which runs nearly through the centre of the island north and south, being 1,360 feet high. Besides the table land, it may be recognized by several remarkable and useful elevations. The Saddle, or Red hill, at the west end of the island, although only 377 feet high, is a striking object when seen from the north of Dog island. Morne de la Fortune, 293 feet high, on the east

side of Simson lagoon, forms a bold promontory and conical peak. The southernmost bare rocky peak of the western range of hills, 900 feet high, which when seen from the north-west and south-east resembles a colossal face leaning backwards, to the south-west; and the little conical hill, 697 feet high, on the summit of which will be seen fort Willem on the west side of Grande bay, are all very remarkable.

The west end of the island terminates in a dangerous, low, sandy point. The north-east end is high and bold; and being separated from the main ridge by a deep broad valley, when seen at a distance from the W.N.W. or E.S.E. it has the appearance of a separate island. The south-east end is formed by a high bluff, faced by a remarkable perpendicular white cliff, from which it receives the name of Blanche or White point.

Grande bay,* at the south-east end of St. Martin, is the principal anchorage in the Dutch quarter. On the low, narrow sand ridge at its head is situated Phillipsburg, the chief town and seat of government; and at the back of it is the most valuable salt pond in the island, 4 feet 8 inches below the level of the sea. The eastern side of the bay is a mile in length, and is formed by a lofty promontory, which terminates to the southward at Blanche point; the western side is formed by a flat, narrow, rocky neck of land 104 feet high, and nearly 2 cables in length, connected to the main by a low sandy ridge, which, with the line of shore to the northward, makes this side nearly three-quarters of a mile long. On the extremity of the ridge stand the ruins of fort Amsterdam and the barracks. The entrance between the headlands is a mile wide, and free of danger.

LIGHT.—A fixed white light is shown from fort Amsterdam, 150 feet above the sea, and visible about 8 miles.

At about a quarter of a mile north-west of Blanche point, is the beginning of a narrow sand bar, which leaves the shore and sweeps round the east and north sides of the bay at a distance of from a quarter to half a mile, with from 6 to 10 feet water on it. Within it there is a narrow deep vein of from 12 to 15 feet water, and about a quarter of a mile from the western shore there is a cut in the bar, where there is a depth of 11 feet. A small vessel will find this an excellent anchorage; but it will require the assistance of a pilot, as no marks can be given, and the opening shifts.

There is a similar cut at the east end, but the wind under the high land is so uncertain that it is quite unavailable to sailing vessels.

Prosélyte.—This very dangerous rock has only $2\frac{1}{4}$ fathoms on it, and seldom breaks in the strongest winds. It is not more than 35 yards in

* See plan :—Grande bay, scale $m = 4$ inches, on Admiralty chart No. 2,079.

extent, and the marks for it are, fort Willem in one with the ruin of the fort on Amsterdam point, bearing North; Blanch point N.E. distant nearly $1\frac{1}{2}$ miles; Cherry cap in line with Pelican point N.E. $\frac{1}{4}$ E.; and the Governor's flagstaff in one with a remarkable house (Nesbitt's) on the lowest part of the ridge of hills to the north-east of the town of Phillipsburg, and close to the highest conical peak on the east side of Grande bay, called the Oosten Berg, bearing N.N.E.; the latter, however, is a difficult mark to be made out by a stranger. The south and south-west sides of this rock lie just within the 10-fathoms line, and a ledge of from 6 to 9 fathoms runs off to the distance of three-quarters of a mile to the south-east of it, which serves as a warning when approaching it from that quarter.

Directions.—When approaching Grande bay from the eastward round Blanche point at the distance of a quarter of a mile, then haul up gradually into the bay, prepared to meet the eddy winds and sudden gusts which rush off from the high lands to the north-east, and anchor in the centre of it, in a depth most convenient to the vessel's draught, bearing in mind that within the depth of 5 fathoms the soundings decrease rather suddenly to $3\frac{1}{2}$ and 3 fathoms.

For vessels of moderate draught the best anchorage will be found with Blanche point bearing E.S.E., and the Governor's staff, which is near the east end of the town, N.N.E. in 6 fathoms, good holding ground; but generally heavy rollers make the riding here very uneasy, and cause a high surf on the beach.

In approaching the bay from the southward or in beating up to it from the westward, great care must be taken to avoid the Prosélyte rock.

In standing in for Grande bay from the southward, to windward of the Prosélyte rock, do not bring Blanche point to the eastward of North, or open out the Oosten Berg (the conical peak before spoken of) to the westward of the point, until within the rock, or the great Grouper islet (page 125) comes on with the hummock on the slope of the easternmost heights of St. Bartholomew.

In working up in-shore from the westward, when approaching the rock, do not open the Grouper to the left or northward of the highest hill at the east end of St. Bartholomew. When leaving the anchorage, the Governor's staff in one with the Oosten Berg, bearing N.E. by N., will lead out clear to the westward of the rock, and when the Grouper comes open to the northward of St. Bartholomew, the vessel may be hauled to the wind.

Simson bay.—To the westward of Amsterdam point the south shore of St. Martin is composed of small sandy bays, separated by bold woody

heights, steep-to, for the distance of $2\frac{1}{4}$ miles, where it terminates at Pelican point, a low rocky point forming the east end of Simson bay. From this point a narrow ledge, on which there are from 2 to 4 fathoms water, extends out half a mile to the southward; and about $1\frac{1}{2}$ cables to the north-west of the point are the Pelican rocks, 3 or 4 feet above the sea.

From thence a low sandy shore sweeps round to the westward, forming Simson bay, which is a mile wide, and half a mile deep with indifferent anchorage in the centre of it, midway between the points in $4\frac{1}{2}$ fathoms water. At the east end of the bay there is generally a boat channel into the lagoon, but it is not always open. Thence, to the west end of the island, the shore is low, and bounded by sandy beaches, separated by low rocky and sandy cliffs.

Caution.—Great care must be observed in rounding Terre-Basse point, the west extreme of St. Martin, in the night, for a shallow spit runs off W.S.W. three-quarters of a mile from it, and the soundings are so deep on its edge, that the lead will not be of much use; within almost a mile of the spit the depth is 50 fathoms. In the daytime the spit may be seen from aloft, and rounded by the eye. If cloudy, keep Fourche island open to the southward of St. Martin, until Terre-Basse point bears to the southward of East. Having rounded the spit be careful not to haul up too suddenly, or come within the depth of 7 fathoms, as this end of the island, between Plum point and Marigot bluff, is foul to the distance of nearly a mile from the shore. In working up to Marigot bay, keep the Anguilla shore aboard until Marigot bluff bears South.

Marigot bay* lies about $3\frac{1}{2}$ miles to the eastward of the west end of St. Martin, and between Marigot bluff and Arago point it is $1\frac{1}{2}$ miles wide, and half a mile deep with excellent anchorage, protected from all winds but the N.W.; it seldom, however, blows strong from this quarter. The bay is exposed to the rollers, which will sometimes break on its south-west side, at half a mile from the shore, and send in a heavy dangerous surf on the beach.

The town of Marigot is at the east end of the long sandy beach which forms the bottom of the bay, at the base of a hill, on which stands a small fort commanding it. It is the chief settlement and port of entry of the French quarter.

Landing is inconvenient at all times, and sometimes attended with risk, especially in the night, on account of the numerous sunken rocks which skirt the shore; a landing stage has been erected for the convenience of boats, it is south of Morne Marigot, and is in prolongation of the north street of the village; the best spot is at the extreme east end of the beach at the foot of the Fort hill, and having landed, the boat had better lie off

* See plan:—Marigot bay, scale, $m = 4$ inches, on Admiralty chart No. 2,079.

at a grapnel. To the eastward of Round hill,—which cuts the beach in two nearly in the centre, is 40 feet high, and very remarkable,—the shore of the bay is skirted by a flat coral ledge.

The *Medée* shoal is the only danger in Marigot bay, and was first discovered by a vessel named the *Medée* striking on it. This rocky shoal is nearly circular, and a cable in diameter, having on its north-east edge as little as 15 feet water, with from 20 to 24 feet to the south-west of it. It lies W. by N. 4 cables from Arago point, and the channel between has from $3\frac{1}{2}$ to 4 fathoms in it, but it is always better to pass outside the shoal.

Light.—A fixed *green* harbour light, visible 3 miles, is exhibited from a post painted white, situated in the south-west of the fort of Marigot; it is not visible when bearing southward of S. 25° E.

Directions.—In approaching Marigot bay from the eastward, keep the Saddle or Red hill, at the west of St. Martin, in one with the north side of Marigot bluff bearing S.W. $\frac{1}{4}$ S., until Round hill comes in line with Morne Fortune peak S. $\frac{1}{2}$ E.; then haul in, and anchor on this line, or a little to windward of it, in 4 fathoms water, with Marigot bluff bearing W. by S.; or the Crole rock just open of the land to the north-east; it is not advisable to go farther in, unless in small vessels, when a berth may be taken up according to draft, being guided by the chart.

When beating into the bay from the westward it will be better to keep in the offing until this latter mark comes on, as the breeze will there be found more steady. Red hill in one with the south side of Marigot bluff S.W. $\frac{1}{2}$ W. leads $1\frac{1}{2}$ cables northward of *Medée* shoal, and the fort (now 1883, a ruin) in one with mount Accords S.S.E. $\frac{3}{4}$ E. leads about the same distance to the south-west. The mount is a very remarkable peak, 978 feet high, near the end of the long ridge which runs inland to the southward of the town; there is a smaller elevation outside it, nearer to the sea, but it cannot well be mistaken.

Crole rock.—From Arago point to the north point of St. Martin, the shore is clear and steep-to, the soundings regular, and it may be approached to half a mile. The most remarkable object on this part of the coast is the Crole rock, a small, barren, black, rocky islet, with a rounded summit, rising on its north side 120 feet perpendicularly from the sea. It lies about $1\frac{3}{4}$ miles westward of the north point and 2 cables from a point adjacent to the rock, almost equally remarkable, from its terminating in a detached conical peak of somewhat greater elevation.

Grande Case.—Southward of Crole rock there is a deep sandy bay named Grande Case, which offers secure anchorage for droghers. A red buoy marks the north-east extreme of a rock surrounded by a flat of sand and gravel, in Grande Case bay. Vessels in entering it are guided by the eye. From the head of this bay an extensive low valley, in which there are

several cultivated salt ponds, runs across to Orient bay, on the opposite side of the island.

The north point of St. Martin is skirted by a reef, to the distance of 2 cables; but it always shows itself, and is steep-to.

Orient bay lies on the north-east side of the island, at about $1\frac{3}{4}$ miles southward of the north point, and its entrance, about half a mile wide, is between two small islands surrounded by dry reefs. From Pinels, the northern island, the reef extends off to the distance of nearly half a mile. The bay is about a mile deep, and vessels sometimes visit it with the assistance of a pilot, but being exposed to the full force of the trade wind and heavy sea, it is only secure for droghers or small fore-and-aft vessels, which find shelter at both ends of it. From the southern island the shore becomes foul and dangerous as far to the southward as abreast Guano cay; nearly midway, however, there is a small cut leading into a well-sheltered creek, called the Oyster pond.

The Oyster Pond* has a depth of 10 feet, and small vessels lie up here in security during the hurricane season. Although marks are given on the plan for entering the channel, it is so tortuous, narrow, and intricate, that no directions would be of use, for it can only be navigated by the most expert pilots, and then only under favourable circumstances.

Caution.—In general the sea is so heavy on the east side of St. Martin, that the shore should not be approached by large vessels within the line of the adjacent islets, except in case of necessity.

Tintamarre (called also Hat, and Flat island, from its appearance at a distance) is $1\frac{1}{2}$ miles long, in a N.E. by E., and S.W. by W. direction, and half a mile broad, and lies about 2 miles eastward of the north point of St. Martin. It is uninhabited, but belongs to a resident in that island.

The north side of this island is formed by a bold rocky cliff, topped with trees, which towards the east end rises almost perpendicular from the sea to the height of 90 feet, and when seen from the eastward is very remarkable; its south and west sides are low and sandy. It is bordered on all sides but the west with a coral reef, which extends a quarter of a mile from the north shore, and half a mile from the south, and terminates at that distance at the south-west point of the island. There is tolerable landing in the sandy bay at the west end, and a small vessel will find temporary anchorage at about half a mile from this part of the shore in 8 or 9 fathoms water.

The channel between Tintamarre and Pinels island reef is about a mile wide, and carries from 10 to 12 fathoms water; but it should not be used except from absolute necessity, more particularly as it is encumbered by a rock named the Spaniard, which lies in its northern entrance.

* See plan :—Oyster pond, scale, $m = 6$ inches, on Admiralty chart No. 2,079.

The Spaniard rock* is a very small dangerous head of coral, just beneath the surface, and over which the sea breaks heavily with strong winds, but in moderate weather it does not show itself. It lies W.N.W. rather more than a mile from the north-west end of Tintamarre, and E. by N. $\frac{1}{2}$ N. $1\frac{1}{4}$ miles, nearly, from the north point of St. Martin. Fort Willem in one with the east end of Pinels island bearing S.S.W $\frac{1}{2}$ W., leads eastward of the rock; the south-west point of Tintamarre in one with the first hollow in the high land at the west end of St. Bartholomew (a very indistinct and difficult mark), leads to the north-east; and the east end of St. Bartholomew well open westward of the same point clears it to the south-west; and the Crole rock well open of the north point of St. Martin leads to the northward. Vessels, therefore, whether running or beating through the channel between St. Martin and Anguilla, have only to be careful when approaching this danger to keep the Crole rock well open.

ANGUILLA. †

This island has been an English settlement since 1659, and is under the superintendence of a magistrate, attached to the government of Antigua, who resides at the little village in Crocus bay. The island received its name from the early Spanish navigators, from its supposed tortuous figure resembling an eel; but in fact it lies nearly on a straight line in a N.E. by E. and S.W. by W. direction, with no indentation of any extent on either of its shores. It is 14 miles long, and the eastern half is from 2 to 3 miles broad, but the western portion tapers gradually away to a point. It has an area of about 35 square miles, and the population is more than 3,000.

The eastern portion of the island is the most elevated, and in the neighbourhood of Crocus bay, near the centre of the island, it is 213 feet high, but it has no remarkable hills. The western portion declines gradually, and at the end it is only 30 feet high. The southern side is generally much lower than the northern, and as far westward as Rendezvous bay it is fringed with a coral reef, dry in many places, from one to 2 cables from the shore, and steep-to. There are, however, several little cuts through it, which will admit boats of large size into good shelter.

Rendezvous bay, on the southern shore of Anguilla, nearly north of Marigot bay in St. Martin, affords good shelter to small vessels, and is a convenient spot for obtaining wood. In entering the bay avoid the end of the reef which extends 2 cables from Shaddick point, the east extreme of the bay; this can be done by the eye from aloft.

* See views on Admiralty chart No. 2,038.

† See Admiralty chart No. 2,038, scale, $m = 0.42$ inch, with views.

The narrowest part of the channel between Anguilla and St. Martin, is between Blowing point, at about a mile eastward of Shaddick point, and Crole rock, where it is 3 miles wide. Boats communicating between the two islands generally land at Blowing point, whence there is a road to Road and Crocus bays.

Blowing rock (so called from the sea forcing itself occasionally through an aperture in the surface, giving the appearance of a whale blowing) is a small rocky islet, about 6 feet above the sea, lying S.E. by E. three-quarters of a mile from the west end of Anguilla; it is bold and steep-to outside, but within it there is only a channel for boats.

Anguillita is a small rocky cay, 20 feet high and covered with brushwood, lying a quarter of a mile W.S.W. of the west end of the island, to which it is almost connected by coral heads, leaving only a passage for boats. It is bold and steep-to on its south-west side.

South Wager is a small barren rock, about 20 feet high, lying about 2 cables from the northern shore of Anguilla, at $1\frac{1}{4}$ miles from its western end, which is here formed of remarkable low cliffs. The rock comes conspicuously in sight after rounding Anguillita, and is steep-to.

From abreast the South Wager, the shore to Mead point, at the east end of Long bay, is clear, and may be approached freely. From Mead point to Road bay, $2\frac{1}{4}$ miles eastward, the coast is composed of remarkable perpendicular cliffs, 150 feet high.

Dowling shoal and islet.—The Dowling shoal is about $1\frac{1}{2}$ miles in extent east and west, and three-quarters of a mile north and south. Its western edge lies North of Mead point, and the channel between, which is about three-quarters of a mile wide, carries a depth of from 6 to 9 fathoms; small vessels leaving Road bay may run through it, but in beating up from the westward it is better to keep outside the shoal. Fork mountain, in St. Martin, open west of Mead point bearing S.S.E. $\frac{1}{2}$ E., leads nearly half a mile westward of the shoal.

On the northern edge of the shoal there is a small rocky islet of the same name, 4 feet above the sea, and steep-to on the north-west, but foul to the distance of a quarter of a mile to the north-east. At nearly half a mile E.S.E. of the islet, on the eastern edge of the shoal, is a small low sandy cay, called Sandy island, covered with brushwood to the height of 6 feet; there is no safe channel between, and to the south and south-east it is foul for more than a third of a mile. Sandy island bears W.N.W. $1\frac{1}{4}$ miles from Road bay bluff, with a passage between.

Road bay* is about three-quarters of a mile deep, and affords excellent anchorage for small vessels. On the low narrow ridge of sand at the head of the bay there is a small settlement, the inhabitants of which cultivate the extensive salt pond at the back of it. There is no danger in the bay; the bluff is steep-to, and having rounded it, haul in and choose a berth according to draught. With the bluff N.E. by N. the depth is 19 feet, and decreases gradually to the shore.

From Road bay bluff the northern shore of the island still continues bold and scarped to the north-east for 2 miles, to the little valley at the head of Crocus bay, the lofty wooded cliffs being here skirted by a sandy beach. From thence it turns suddenly to the N.N.W., and forms the east side of Crocus bay.

Crocus bay.*—This part of the northern shore of Anguilla is composed of most remarkable perpendicular white cliffs, with wooded summits, which serve as an excellent guide, when beating up from the westward. The north end of the bay, named Flat-cap point, terminates in a curious, small, flat-topped rock, hence its name. The principal settlement is in the south-east corner of the bay, and the houses are scattered about the valley and adjacent hills. The custom house with its flagstaff stands on the south side of the bay, on the summit of a hill 218 feet high, the loftiest in the island. The best landing place is a little to the northward of the road leading up the valley, but there is always a heavy surf on the beach.

In the middle of Crocus bay, and S.W. about three-quarters of a mile from Flat-cap point, lies a coral patch of 5 fathoms, about 2 cables in extent, which should be avoided when anchoring. The marks for it are, the Jewel (a small rock lying close to the shore, half a mile to the north-eastward of Flat-cap point), seen just open of that point; and a remarkable large tamarind tree on the north side of the landing place, in one with conspicuous white house, on the lowest part of the hill above the beach, E. by S. $\frac{1}{2}$ S.

Supplies.—Stock and firewood may be obtained in Crocus bay, but no water. Yams are in abundance, and probably the finest in this part of the West Indies; when sprinkled over with wood ashes, they have been known to keep good for four months.

Anchorage.—The best anchorage in Crocus bay is with Flat-cap point bearing N.N.E., and the custom house, S.E. $\frac{1}{2}$ E., in 7 fathoms water, white sand, and excellent holding ground. The bay is exposed to westerly

* See plan.—Road and Crocus bays, scale, $m = 2$ inches, on Admiralty chart No. 2,079

winds and the rollers; the former, however, seldom occur, and generally give sufficient warning to enable a vessel to get under way in time; the latter frequently set in with great violence, and render the riding unpleasant, and landing very difficult.

Directions.—A stranger bound either to Crocus, or Road bay, without a pilot, or good local knowledge, if coming from the northward, had better run to leeward of Dog island and beat up. If from the east or south-east run through the clear channel between Anguilla and St. Martin, haul round Anguillita, and act in the same way. There will be no difficulty in doing this; there is seldom any current; the water is smooth, and if overtaken by night good anchorage will be found anywhere under the south side of the cays and reefs north-west of Crocus bay, taking care however to avoid the Dowling shoal. Vessels when leaving the bays, and bound to windward, with the assistance of a pilot, may take the Northern channel.

Northern Channel.—This opening is between the east end of Seal islands reef and Flat-cap point, and is $1\frac{3}{4}$ miles wide. Nearly, however, in the centre, but rather nearer Anguilla, there is a dangerous narrow ledge, named Middle bank, half a mile long N.E. by N. and S.W. by S., on which the depth is from 20 to 24 feet. The bottom is distinctly seen on this bank, and with the heavy sea which generally prevails here in the winter season, it frequently breaks, and becomes dangerous, as no good marks can be given, although there is a clear channel on either side.

Marks are given on the plan to pass to the northward of the bank, but they can only be of use to those possessing a local knowledge of the place; its south end lies about North three-quarters of a mile from Flat-cap point; and its north end, E.S.E. about a mile from the east end of Seal islands reef. The south side of the east end of the Seal islands reef breaks in heavy weather, and is steep-to, but foul ground extends out a quarter of a mile from its north-east side, and is extremely dangerous. If approaching from the northward, with the view of using this channel, bring the custom house in line with the western peak on St. Martin, which mark leads about a mile to windward of Seal islands reef, and 2 cables eastward of the middle bank.

Tides.—A strong weather or easterly current will sometimes be found in Crocus bay, to which a vessel will tend, even in fresh winds; tides rise from one to 2 feet depending on the wind.

Shawl rock.—2 miles eastward of Flat-cap point, the west end of a dry reef commences, and trends to the north-eastward at nearly a mile off-shore; and at 4 miles from the point, and half a mile outside the main

body of the reef, there is a dangerous rock, named *Shawl*, which does not always break, and is steep-to. The shore then continues foul to within a mile of *Snake point*, the north-east end of *Anguilla*. In beating up, the vessel's safety will be insured when approaching this reef and rock by proper attention to the lead; for here the 20-fathoms line of soundings runs along at $1\frac{1}{2}$ miles from the shore, decreasing suddenly.

Within the reef, at the west end, there is good shelter for a boat, and through a narrow intricate opening near the east end, droghers find an anchorage.

Scrub island is separated from *Anguilla* by a narrow channel of deep water about a quarter of a mile wide, but it should not be used, as its western side is skirted by a reef nearly dry to the distance of a cable, upon which a vessel may be forced by the sudden flaws which come off the lee side of all these islands.

This island lies on the same line of direction as *Anguilla*, and is 2 miles long and half a mile broad; it is covered with brushwood and stunted trees, which at the west end are about 50 feet above the sea. The east end is low, and from it extends a narrow strip of low rocks to the distance of half a mile; they are 8 or 10 feet high, steep-to, and in general the sea breaks violently over them, but in approaching them from the north-east they are hidden under the high part of the island, and are exceedingly dangerous, for the soundings are so deep, the depth being 27 fathoms within half a mile of them, that the lead will scarcely give warning.

Near the centre of the north shore of *Scrub island* there is a little hill of white sandstone, which, when the sun shines on it, is very remarkable. There is tolerable landing on the beach at the north-west end of the island, and good shooting.

Little Scrub island lies about three-quarters of a mile westward of the above hill, and is equally conspicuous from the contrast in colour, it being a barren precipitous black rock 40 feet high, and steep-to.

Dog island is the westernmost of a group of small islets and cays extending westward from the north-west side of *Anguilla*, and lies N.N.W. $\frac{3}{4}$ W. $8\frac{1}{2}$ miles from *Anguilla*. It is $1\frac{1}{2}$ miles long, east and west, in the centre three-quarters of a mile broad, and about 80 feet high; and thence tapers gradually to points at its extreme ends. It is covered with brushwood and grass, affording pasturage to an excellent breed of horses and sheep, which are tended by two or three of the inhabitants of *Anguilla*; there is consequently water on the island.

The east end and south side of *Dog island* are bold and steep-to. At 2 cables from the centre of the southern shore there is a remarkable small black rock, named *Bay rock*, 4 feet above the sea; and nearly abreast of

it, just within the bluff rocky point which forms the south extreme of the island, is the landing place. The west end of the island is formed by a high perpendicular cliff, and from it a broken ledge of rocks extends three-quarters of a mile to the westward, terminating at a small low rocky islet, called West cay, 6 feet above the sea, and steep-to on its west side.

From west Cay the ledge of broken rocks continues to sweep round the north side of the island to the east end. Near the centre, at a quarter of a mile from the shore, is Middle cay, a remarkable, small barren islet, its north-east side being a perpendicular black cliff, 60 feet high. It stands on the edge of the ledge, and on the very brink of soundings; there is no bottom at 100 fathoms within a mile of it.

One mile to the eastward of Middle cay and similarly situated, is another small low rocky islet named East cay, covered with brushwood, and equally steep-to on its north side.

Caution.—In the daytime West cay may be passed within a quarter of a mile without fear, but in the night it should be approached very guardedly, for the soundings are so deep alongside it, that the lead will be of little use; within a mile of the cay the depth is from 17 to 20 fathoms.

Prickly Pear cays are two small islets lying east and west of each other, and separated by a small boat channel. The western cay is a narrow rugged rock three-quarters of a mile in length, covered with brushwood to the height of 25 feet, upon which there is no landing. The eastern cay is a little lower, slightly wooded, with sandy shores, and about half a mile long, and a quarter of a mile broad; landing may be effected here with care, in a little bight on the west side.

Dog island channel.—Between Prickly pear cays and Dog island there is a clear channel $2\frac{1}{2}$ miles wide, with a depth in it of from 9 to 10 fathoms to within half a mile of the western Prickly pear, when the soundings become so irregular, that in strong winds, especially when accompanied by rollers, the sea tops and frequently breaks. It will, therefore, be always better to pass to the westward of Dog island, except with a free wind and smooth sea.

Flirt rocks are two small rocky islets; the north-western, lying about three-quarters of a mile northward of the Prickly pear cays, is 20 feet high, the other 8 or 10 feet. They are foul all around, but only to a short distance.

Seal reef and islands.—Seal reef commences a little eastward of the Flirt rocks, and continues unbroken to the eastward, where it forms the western side of the north channel into Crocus bay, described in page 135, and is about five miles in length. On its north side it is bold and steep-

to, and dangerous to approach in the night, for the soundings are not sufficiently regular to enable a vessel to come nearer than 4 miles; at this distance the depth is 18 fathoms; within that from 14 to 16 fathoms close up to the reef. The south side is composed of detached shoals and coral heads, which extend three-quarters of a mile from the main body of the reef.

At about $1\frac{1}{2}$ miles to the eastward of the Flirt rocks are several low rocky islets, called the Seal islands, about 5 or 6 feet above the sea.

North Wager is a small black square rock, about 3 feet high, lying on the south side of Seal islands reef, three-quarters of a mile to the eastward of the Prickly pear cays. In beating up to Crocus bay, it serves as a guide when approaching the reef, and a vessel should not stand within or to the northward of it.

Anchorage.—To the southward of the North Wager, from Prickly pear cays to Crocus bay, there is excellent anchorage in 9 or 10 fathoms water, over sandy bottom, and out of the influence of the rollers.

Caution.—Anguilla and the small islands and cays just described are so low in comparison with St. Martin, that when approaching them from the northward at night, from their being backed by the high lands of that island, it is extremely difficult to estimate the distance from them; and in attempting to do so frequent accidents have happened on the north side of Anguilla. It will however be seen, from the charts, that by proper attention to the lead, and to the means of obtaining the latitude pointed out at page 7, such occurrences may be avoided.

SOMBRERO.

This is the northernmost island* of the Lesser Antilles, and the lighthouse on it, is in latitude $18^{\circ} 35' 37''$ N. and long. $63^{\circ} 27' 48''$ W. It is 9 cables long, N.N.E. and S.S.W., 2 cables broad, and at its north end it is about 20 feet high; from thence it ascends gradually to the middle of the island, where it attains the height of 40 feet. Its surface is exceedingly rough and rises in sharp jagged points, the crevices between appear to have been scooped out by the rain and sea water dissolving the coral rock of which the island is composed. The vegetation consists of a few small beds of prickly pear; the only indigenous animal is a black lizard about 9 inches long; and the birds, formerly very numerous, have almost forsaken the island. Fish of indifferent quality may be caught in large numbers off the island. Several veins and some large deposits of phosphate of lime are worked by a Company.

* See Admiralty plan:—Sombrero island, No. 484, scale, $m = 4.7$ inches.

The sides of this island are precipitous and rocky, and quite inaccessible except at a little height on its west side, a quarter of a mile from the south end, and a short distance to the southward of a small rock awash, where under very favourable circumstances, by watching an opportunity, a person may jump on to a flat ledge of the cliff, and with some difficulty ascend to the summit. It lies on a small bank of soundings, which extends to the eastward $2\frac{1}{2}$ miles, with 22 fathoms on its edge; to the southward $1\frac{1}{2}$ miles with 47 fathoms at that distance; to the westward $1\frac{1}{4}$ miles, with from 14 to 24 fathoms; and to the northward $1\frac{1}{2}$ miles with 27 fathoms, coral crust.

From the island the high land of St. Martin is distinctly seen in clear weather distant 40 miles. Dog island bears from it S.E. by S. 21 miles, and the north end of the Anguilla bank E. by S. 24 miles.

LIGHT.—On the south-east side of the island is an open iron framework tower, 132 feet high, and painted red, from which is exhibited a *revolving* light, 150 feet above the sea, which attains its greatest brilliancy every minute, and should be visible 20 miles.

Anchorage.—There is anchorage on the west side of the island in 6 and 7 fathoms close to the rocks, also in from 10 to 14 fathoms, and heavy moorings are laid down for the vessels that ship the produce of the quarries. The prevailing winds are from N.N.E. to S. by E.; westerly winds seldom blow home.

Tides.—At all the islands of this group, viz., St. Bartholomew, St. Martin, Anguilla, and Dog island, there is a rise and fall of from one to two feet, but the periods are so irregular that the exact time of high water cannot be correctly defined. The following observations made by Doctor Fahlberg, a resident of these islands for a long period, are valuable, and no doubt give the best information on the subject.

“About St. Bartholomew the flood at full and change runs S.E., and it is then generally high water at 10.30 p.m., while the sun is farthest to the north of the equator; but comes about two hours sooner in the succeeding months, until the sun gets farthest to the south, when it is high water at 10.30 a.m., and it runs afterwards in the same proportion back again. The winds, which are of long continuance, sometimes make a trifling difference. The sea is always lowest at the time when the sun is farthest to the north, and the contrary.”

During the surveys of these islands, which were conducted during the winter season, between the months of November and March, by Captain E. Barnett, R.N., neither tidal stream nor current were detected; except on one or two occasions, while at anchor in Crocus bay, on the north side

of Anguilla, when a strong easterly or weather set was observed, and on one occasion to the eastward of St. Bartholomew, after a long period of strong trade wind, a westerly set ran for a short time one mile an hour; but in general no difficulty was found in beating up from one island to another.

CHAPTER IV.

THE VIRGIN ISLANDS ; ANEGADA TO CULEBRA, INCLUDING
SANTA CRUZ.

 VARIATION IN 1887.

 Anegada, $1^{\circ} 5' \text{ W.}$ | Culebra, $0^{\circ} 35'' \text{ W.}$

THE VIRGIN ISLANDS.

THIS group* of about 100 small islands and cays was discovered by Columbus on his second voyage, in 1494. For some time they were chiefly in the hands of the buccaneers, but in 1666 Tortola, Virgin Gorda, and Anegada came into the possession of the English: and in 1672 the Danes colonized St. Thomas and St. John. The first settlers at Santa Cruz were the Dutch in 1643; but it afterwards passed successively into the hands of the English, Spaniards, and French; and in 1733 it was sold by the latter to the Danes, who still possess it, and is the seat of government of the Danish islands. The third portion (sometimes called the Passage islands), which includes Culebra, Bieques or Crab island, and the small islets between them and Puerto Rico, are not regularly settled.

The line of demarcation between the English and the Danish islands runs from the north between Little Tobago and Hans-Lollik; from thence to the channel between Thatch island, Tortola, and St. John, round the east end of the latter, and thence through the Flanagan passage.

Aspect.—On making the Virgin islands from the northward, Virgin Gorda will be seen on the extreme left, rising in a clear well-defined peak, 1,370 feet high. Anegada being only 30 feet above the sea, will not be seen more than 5 or 6 miles. Next to Virgin Gorda, Tortola will appear the most conspicuous; Sage mountain, the highest in the island, does not rise into a peak from this direction, but appears flattened and elongated; its height is 1,780 feet. Immediately to the westward of it will be seen the rugged pointed peaks of Jost Van Dyke, 1,070 feet high, and behind them the irregular small peaks rising from the table land of St. John, and varying in elevation from 800 to 1,225 feet.

* See Admiralty chart:—Virgin islands, No. 130, scale, $m = 0.25$ inch.

If on or near the meridian of $64^{\circ} 50'$ W., and about 20 miles to the northward of the islands, a separation will be observed between St. John and St. Thomas, as the small cays which lie off and between them will not be seen; but the other islands, viz., Virgin Gorda, Tortola, Jost Van Dyke, and St. John, will appear as one large island, the prominent peaks on each being alone distinguishable.

The island of St. Thomas may be recognised by having a large saddle on its centre, formed by Signal hill and West mountain, the former 1,500, the latter 1,550 feet high; and the island is less rugged in outline than the others. This saddle is equally conspicuous from the southward. Culebra, from the above position, will be only just in sight. Its hills are more rounded than the others, and much less elevated, being not more than 650 feet high.

Tides.—The phenomena of the tides among the Virgin islands, although of great importance to navigators, are extremely difficult of explanation; the following rule is given by the fishermen, and in general it may be safely adopted:—From the moon's rising until her meridian passage, the flood runs to the south-eastward or to windward; and from thence to her setting, the ebb runs to the north-westward or to leeward, and vice-versâ with the lower transit; hence there is a six hours stream each way. This rule, however, is greatly modified in different localities, and by the force and direction of the wind.

It is observed* that the southern tide predominates during the summer months, from the middle of June to the middle of August, and two tides have been then known to follow in succession, particularly if the wind has been westerly; and on such occasions the rise was increased by 2 feet. Near the commencement of this remarkable change the stream is observed to set for eight or ten days continually to the southward with a force seldom surpassed, and is called by the fishermen St. John's tide, from its occurring near the day of that saint. For the remainder of the above period, the ebb or northerly stream will run only for about one or two hours.

During the months of September, November, March, and April, the northern tide prevails, and with considerable force, being assisted by the current. At this period also, the highest water is generally in the morning, and there is only a half tide in the evening; the reverse takes place during the summer months. The establishment for high water at full and change appears to be about 9h. 0m.,† but it is liable to great

* See Sir R. H. Schomburgk's remarks on the tides of the Virgin islands in the 5th vol. of the London Geographical Journal, 1835.

† From the surveys and remarks of Lieut. G. B. Lawrance, R.N., 1850.

uncertainty, for sometimes it is as early as 7h. Om.* The rise and fall at springs is from one to $1\frac{1}{2}$ feet; but in the months of April and May the mean level of the sea is observed to be a foot lower than at other periods, which agrees with the observations of Dr. Fahlberg. The duration of the stream is six hours each way, and to which the stranger must pay strict attention, leaving the time of high water as a thing altogether of minor importance.

As already observed, the stream from the northward is called the flood, and that coming from the southward the ebb; strictly, however, this may be an error, although not of much consequence; for the change of set takes place at about half tide on the shore, and the rise and fall being so small, it is difficult to say to which set the term flood should be applied.

It happens, however, that the commencement of the flood stream takes place at full and change, at about 6h. Om., and as it runs for six hours and then changes to the ebb, by remembering this establishment for the first beginning of the flood, the turn of tide can of course be calculated for any intermediate day during the lunation.

As 6h. Om. happens to be nearly the time of the moon's rising at full and change, we have the fishermen's rule explained.

VIRGIN BANK.—It will be seen by the chart† that the extensive group of the Virgin islands lies on the southern edge of a vast bank of soundings, stretching out from Puerto Rico to the east end of Anegada, and on the meridian of $64^{\circ} 40' W.$ as far to the northward as lat. $18^{\circ} 51' N.$ about 15 miles W.N.W. of the west end of Anegada, whence the edge gradually approaches to within $1\frac{1}{2}$ miles of the north side of that island. From the above position it trends to the south-west 15 miles, when it assumes a more westerly direction, and runs nearly in a straight line for the north-east point of Puerto Rico. It will therefore be seen that the bank extends about 14 miles to the northward of St. Thomas, increasing to 23 miles on the same tide of Tortola.‡

On the southern side of the group the edge of the bank lies only $1\frac{1}{4}$ miles from Norman island; thence it takes a south-west direction to the meridian of the west end of St. John, when it trends to the westward, passing about 7 miles from the south sides of St. John and St. Thomas, and 2 miles from Crab island.

* Sir R. H. Schomburgk says 10h. Om.

† By Lieut. G. B. Lawrance, R.N., in 1848-51. See Admiralty charts :—Virgin islands, Sheets I., II., and III., Nos. 106, 106a, and 106b. scale, $m = 1.1$ inch.

‡ It is reported that, from the loose sand and strong current, the bank from the north-west end of Anegada is extending farther westward than when surveyed by Lieut. Lawrance, in 1848-51.

The soundings on the south side of the islands differ in a remarkable manner from those on the north. Here the edge of the bank, bold and wall-sided, lies at the distance of only from one to 7 miles from the cays, and close within it is a narrow ledge of coral, about a cable wide, with a depth of from 15 to 19 fathoms, which continues unbroken from the Horse-shoe reef at Anegada nearly to Crab island, having immediately within it from 25 to 30 fathoms water.

The general depth on the north side of the islands is from 28 to 30 fathoms, coral sand, with rocky patches from half a mile to 4 miles in extent, on which the soundings vary from 6 to 15 and 20 fathoms. These patches lie from 2 to 7 miles from the edge of the bank. Eastward of $64^{\circ} 40'$ W. the depth is from 15 to 22 fathoms, shoaling to 7 fathoms on nearing the west end of Anegada.

Whale bank is the most northern of these patches, and has 10 fathoms water on it, coral rock. Irregular soundings extend nearly 4 miles to the northward varying from 12 to 20 fathoms; a mile southward of the bank there are 25 fathoms, and east and west of it shoal water extends for nearly a mile.

Turtle head is a small coral patch, lying south-west of the Whale, with as little as 6 fathoms water on it. A quarter of a mile northward there is a depth of 25 fathoms, whilst to the southward uneven ground extends nearly $1\frac{1}{2}$ miles, with soundings of from 11 to 18 fathoms. When on the head, the west end of Jost Van Dyke will be seen in one with the westernmost hill on St. John bearing South, and Virgin Gorda peak E. by S. $\frac{3}{4}$ S.

Barracouta banks are several patches with from 11 to 20 fathoms water on them, and lie from 2 to 4 miles from the edge of the bank, the shoalest parts being at their north-east and north-west ends.

Kingfish banks are two coral patches, each about a mile long and half a mile wide, with 8 fathoms water on them; they are one mile apart, with a depth of 23 fathoms between. When on the northern bank the highest peak of Jost Van Dyke bears S.S.W. $\frac{1}{2}$ W. $6\frac{1}{4}$ miles, and Guano island peak S.E. by E. $\frac{1}{2}$ E.

With the exception of some rocky patches, having about 18 fathoms water on them, the above are the only off-lying shoals on the north side of the group.

ANEGADA OR DROWNED ISLANDS.

This island,* the most northern and eastern of the Virgin group, is included in the British portion, and has a population of 450, whose chief

* See Admiralty chart :--Virgin islands, Sheet I., No. 106, scale, $m=1\cdot1$ inch.

employment is fishing and wrecking ; the principal settlement is on the south side, 6 miles from the west end. The immediate neighbourhood of this island is so dangerous, that more accidents occur here than at any other of the Windward islands. This arises chiefly from its being low, the strength and irregularity of the tides and currents in its immediate neighbourhood, and its being the first land which vessels make for (imprudently) when bound from the eastern shores of North America to St. Thomas, American vessels are consequently found to be the greatest sufferers.

In the daytime, however, with clear weather, the risk is not so great, as Virgin Gorda peak, 1,370 feet high, serves as a beacon, placed as it were to warn and guide mariners clear of all its dangers. Anegada lies within $1\frac{1}{2}$ miles of the edge of the Virgin bank, but the soundings are so deep up to it that the lead is scarcely of any use. It is 9 miles in length E.S.E. and W.N.W., and from one to two miles in breadth; almost uniformly about 30 feet high, and covered with brushwood excepting in a few spots which are cleared for the cultivation of corn and vegetables. A large portion of the interior is cut up by extensive salt-water lagoons, hence its name.

Fresh water may be obtained by digging wells in the sand, particularly near the beach at the west end of the island, but the inhabitants prefer drinking the rain water caught in the natural cisterns formed in the rock.

Horse-shoe reef.—The island of Anegada is skirted on its outer or northern side, by a narrow frontier reef, to the distance of from a cable at its extreme north point to $1\frac{1}{2}$ miles at its east end ; thence a most dangerous broken reef extends S.E. by S. for 7 miles, upon which most of the wrecks occur. This portion is called the Horse-shoe reef, and from its south end detached coral heads and shallow ledges extend $4\frac{1}{2}$ miles S.W. by S., where they terminate at the Herman reefs, on which the sea generally breaks.

Two miles W.S.W. from the south-eastern pitch of the Horse-shoe reef is a heap of dead white coral, 3 feet out of water, called the White Horse ; $2\frac{1}{2}$ miles to the eastward of the pitch end there are 34 fathoms on the edge of soundings, and within a mile of it there are 10 fathoms. Abreast the Herman reefs the edge of soundings is little more than a mile distant, which makes them still more dangerous. The south end of this reef bears N.E. by E. $\frac{1}{2}$ E. $5\frac{1}{2}$ miles from Pajaros point, the east end of Virgin Gorda, and S. by E. $\frac{1}{2}$ E. $9\frac{1}{4}$ miles from the east point of Anegada.

Robert reef is a small rocky patch with $4\frac{1}{2}$ fathoms water on it, lying $3\frac{1}{2}$ miles within or to the westward of the Herman. From it Pajaros

point bears S. by W. $\frac{1}{2}$ W. $4\frac{1}{4}$ miles ; and the Western Seal Dog is in one with Cockroach cay (both off the north-west end of Virgin Gorda) S.W. by W. $\frac{3}{4}$ W. At $1\frac{1}{4}$ miles to the north-east of this reef there is also a small rocky head with 4 fathoms on it.

Hawks-bill bank is a small rocky ledge, on which there are from 3 to 5 fathoms, lying about 2 miles to the N.N.W. of Robert reef. From its western edge Pajaros point bears South $5\frac{1}{2}$ miles. These patches should be avoided when anchoring under the lee of Horse-shoe reef. The water is, however, so clear that the bottom may be seen distinctly in 8 or 9 fathoms.

Anchorage.—The north side reef terminates at the west end of Anegada about $1\frac{1}{2}$ cables from the shore, but the south side of the island is foul for more than 2 miles off. There is good temporary anchorage off the west end, in from 5 to 6 fathoms water, at about a mile distant. It will not be prudent, however, to remain here during the period of the Rollers, which frequently occur from October to May ; it will be better at that season to anchor well under the south side of the island.

The best anchorage will be found in 6 fathoms, with the west end bearing N. by W. $\frac{3}{4}$ W. $5\frac{1}{2}$ miles ; the cocoa-nut trees at the settlement at Pearl point N.E. by N. ; and the east point E. by N. $\frac{3}{4}$ N. Care, however, must be taken not to haul up too suddenly after rounding the west end, attention should be paid to the lead, and do not come within the depth of 5 fathoms.

The bank westward of the meridian of Anegada is chiefly fine sand, and in light weather vessels may anchor on it in safety, taking care to avoid the rocky banks already described.

The Rollers, or ground swell, frequently occur from October to May and continue sometimes three or four days. In general they set in after a prevalence of light East or S.E. winds. Between Tortola and Guano island they have been seen to top and break in 9 fathoms, and on the south-west side of Anegada in $4\frac{1}{2}$ fathoms, anchors are sometimes lifted ; it is consequently dangerous for sailing vessels to come too near any part of the northern shores of the Virgin islands, for they get up suddenly, and during their continuance the wind is too light to keep a vessel under command. They appear to have great influence on the bottom in loosening the sand, and in discolouring the water for some miles to the northward of the islands, as far as the edge of the bank. In some places near the west end of Anegada, where the bottom is composed of very fine sand, the formation of the banks is frequently changed.

VIRGIN GORDA.

This, the easternmost of the Virgin islands,* is easily distinguished on making the land, by its rising gradually to a distinct peak 1,370 feet high; the outline of the island is extremely irregular, affording good anchorages. Its scattered inhabitants are employed in the raising of stock and vegetables, cutting wood, and burning charcoal, for the market of St. Thomas.

From Pajaros point on the east, to Mountain point on the west, the north side of the island is $5\frac{1}{2}$ miles long, and from the latter point to the south point the western shore is five miles. The centre portion is about 2 miles square, and occupied by the immense hill, named Virgin peak, which has been already described. From thence the east end of the island is a narrow strip of land composed of irregular rugged hills, terminating at Pajaros point in a remarkable pinnacle rock, 120 feet above the sea. The southern portion is about a mile in breadth, more regular in outline, from 250 to 450 feet high, and nearly separated from the centre by a small isthmus about a cable across.

The most remarkable feature of Virgin Gorda is on its western side, between Colison point and the south end of the island. The eastern side of this peninsula has been broken up by some violent action of nature into immense granite blocks, which lie scattered about on the shore. The cays and islets to the southward as far as Round rock, 2 miles distant, are also composed of the same kind of stone; and the largest, (which lies nearly half a mile from the south end of the island,) from its having the appearance of a town in ruins, is named Fallen Jerusalem.

Many of these blocks are 60 and 70 feet square; some are merely confined in their places by the weight of others leaning on them; and many with deep rents and fissures in their sides appear ready to fall by the slightest shock. In one or two places the sea finds its way through the crevices, and forms beautiful natural baths. It is also a curious circumstance, that similar granite blocks are found scattered about on Beef island, the opposite side of Sir Francis Drake channel, and nowhere else.

Water.—The island of Virgin Gorda is badly watered; there are two small wells at the south end of the beach in St. Thomas bay, but the yield is little and indifferent. The supply in Gorda sound is equally deficient.

* See Admiralty charts:—Virgin islands, with views, Sheet II., No. 106*a*, scale $m=1\cdot1$ inch; and Gorda sound, No. 2,016; scale, $m=6\cdot0$ inches.

Necker island.—On the North side of Virgin Gorda there are several small slightly wooded cays and islets, the outer or northernmost of which is Necker island, lying N.W. by W. about $2\frac{1}{2}$ miles from Pajaros point. It is nearly half a mile long, north and south, and about a quarter of a mile wide, and towards its north end it is 110 feet high; its south-east side is low and sandy. Towards the north it is bold and steep-to, there being from 6 to 10 fathoms water within $1\frac{1}{2}$ cables; but on the east and west sides it is foul and dangerous to the distance of nearly half a mile. From the south side a broken reef extends off nearly a quarter of a mile, leaving a clear channel, named Virgin sound, with 9 fathoms water in it, and a quarter of a mile wide between the broken reef and the reefs from the islets to the southward; but the channel can only be navigated by small vessels.

The Invisibles are two small rocky heads with only 3 feet water on them and do not always break. They lie E. by S. $\frac{1}{2}$ S. three-quarters of a mile from the north-east point of Necker, and N.W. northerly from Pajaros point; between them and the reef on the east side of Necker the depths are from 4 to 8 fathoms, but on their north and east sides there are from 10 to 11 fathoms almost alongside, and to the distance of a mile off.

Eustatia is a small islet, $3\frac{1}{4}$ cables long north-east and south-west, and 170 feet high, lying three-quarters of a mile to the southward of Necker, and nearly half a mile from the nearest part of Virgin Gorda. Its north side is foul to the distance of a cable, and thence a broken reef extends on almost a straight line along the shore to Pajaros point, under the lee of which, in Eustatia sound, there is a small safe anchorage for droghers. The entrance is through a very small cut in the reef, about half a mile eastward of the islet; but this part of Virgin Gorda should be avoided by strangers, as the ground is foul for some distance outside the cut.

Prickly Pear, the largest of these islets, is a mile in length north-west and south-east, about a quarter of a mile in breadth, and 230 feet high. Its east end is not quite a quarter of a mile from the nearest part of a small peninsula of Virgin Gorda, and in the space between is the Saba rock, 25 feet high. From the west end, the Cactus, a dry and broken reef, runs off $1\frac{1}{2}$ cables in that direction. The north side is bold, and between it and Necker there is good temporary anchorage in 7 or 8 fathoms water in Virgin sound, but care must be taken to avoid the foul ground to the south-west of the latter island.

Mosquito island, the highest of the islets off the north shore of Virgin Gorda, lies nearly a mile westward of Prickly pear, and is $6\frac{1}{2}$ cables

in length north-east and south-west, about one quarter of a mile in breadth, and 250 feet high. From its north end, small detached rugged rocks extend off $1\frac{1}{2}$ cables, the outer one, Mosquito rock, being 24 feet high. From it the Colquhoun reef (dry in most places) extends to the south-east about half a mile, and is bold and steep to outside. This reef with Mosquito island form the north-west side, and Prickly pear island and Cactus reef the north side of Gorda sound.

Gorda sound is an excellent and capacious harbour, $1\frac{3}{4}$ miles long east and west, and three-quarters broad, with an average depth of 11 fathoms over sand and mud; sheltered from all winds, and protected from the rollers. A vessel may refit with great ease and convenience, under the lee of Vixen point, the south end of Prickly pear island, and encamp the crew on the island if necessary. Biras creek, at the south-east corner of the sound, might be made available for heaving down, with very little trouble.

The entrance to the sound lies between the ends of the Cactus and Colquhoun reefs, which are a quarter of a mile apart. From either side the depth gradually increases, and about midway or somewhat nearer the western side, there is a very narrow vein, about 400 feet across, running in a N.N.W. and S.S.E. direction, through which a depth of 6 fathoms may be carried. No marks can be given for this channel, Gnat point bearing South, a little easterly, leads through, but the eye will be a far better guide, as the ends of the reefs are easily seen from aloft. A vessel of large draught had better anchor a boat on the weather side of the channel, in the depth she wishes to carry in.

Directions.—Vessels coming from the eastward intending to visit Gorda sound, or with a view of passing out to the westward of Anegada, or to enter Sir Francis Drake channel by the northern route, on their way to either of the ports to leeward, must approach Virgin Gorda with extreme caution, especially in the night, to avoid falling on the Horse-shoe reef. In the daytime the peak of Virgin Gorda will be a guide, as it is seldom clouded, and may be seen 30 miles off. In the night, the latitude must be continually observed; and if the weather is not sufficiently clear for that purpose, and the longitude uncertain, do not by any means attempt to make the land, high as it is.

If coming from the northward, the parallel of Anegada should on no account be passed in the night. If the island is made (or Virgin Gorda, which will be seen first), on a southerly bearing, it will be better to run to the westward of Anegada, and haul up for either of the passages most convenient; a vessel will always have a free wind for this purpose. It will be far safer to act thus than to attempt to pass to windward of the Horse-shoe reef, which has been the cause of so many disasters.

Vessels bound to St. Thomas are tempted to run this risk in order to save perhaps two days, by having to beat up on the south side of the island; but the latest surveys and these directions will show that there is no necessity for running to leeward round the west end of St. Thomas; and that having passed the west end of Anegada, most of the northern channels may be freely and safely navigated without loss of time, and with the saving of much risk and anxiety.

Coming from windward, bring Virgin Gorda on a W. $\frac{1}{2}$ S. bearing and run down on this course. When within 7 or 8 miles of Pajaros point, Necker island will come in sight and may be boldly steered for, taking care not to bring it to the westward of W. $\frac{3}{4}$ N., in order to avoid the Herman reefs. When Pajaros point bears S.W., distant about $1\frac{1}{2}$ miles, haul up N.W. to avoid the Invisibles, off the east end of Necker, which are not seen until close upon them. Continue on this course until the land to the westward (which will be the north end of Guano island, touching the right extreme of Jost Van Dyke) begins to open of Necker, bearing W. by S. $\frac{1}{4}$ S., when a vessel may boldly keep away to the westward, in 10 and 11 fathoms water.

When abreast the spit of the Horse-shoe reef it may be distinctly seen from aloft, as it breaks in the finest weather; but the Herman reefs only break with a swell or strong breeze, and the dry sand bore to the northward of them, being only 3 feet out of water, is scarcely visible at the former distance. Pajaros point may be rounded at the distance of 2 cables.

If bound into Gorda sound, having opened out the land as before directed, steer West until the peak of Virgin Gorda bears S.S.W. $\frac{1}{2}$ W., when haul in for the leading mark given above in the directions for the sound. Having entered the channel, when abreast the south-east end of Colquhoun reef, a vessel must haul to the wind, and a berth must be chosen as most convenient, in the eastern part of the sound.

Tides.—It is high water, full and change, in Gorda sound at 8h. 30m., and the rise is about $1\frac{1}{2}$ feet. The tides at the entrance of the sound, between the reefs, seldom run more than half a knot, and the flood sets towards Prickly pear island. Between Mosquito island and Anguilla point, south of it, the flood sets to the eastward at the rate of one and $1\frac{1}{2}$ knots. Between Pajaros point and the Horse-shoe reef it seldom runs more than one knot, but its duration varies.

Western roads.—There are two excellent anchorages for vessels of any draught under the western side of Virgin Gorda. The first is formed by an extensive bay between Mountain point, the north-west end of the island, and Colison point, 3 miles S.S.W. $\frac{1}{2}$ W. of it, and is partially protected to the north-west by the Seal and Dog islands. It seldom,

however, blows hard to the westward of North, and the only thing to be prepared for is the ground swell in the winter months. At this season it will be better to anchor in about 13 fathoms water, midway between Great Dog and Virgin Gorda, a mile from either; where with good ground tackling and a long scope of cable out there will be nothing to fear, as the rollers are seldom accompanied by much wind.

The southern anchorage between Colison point and Fallen Jerusalem, $2\frac{1}{2}$ miles to the southward of it, is the best, as if necessary, vessels can weigh and run out to the westward with more ease than in the former. The holding ground is good at both places, and, except occasionally, the water is always smooth. There is a small head of $4\frac{1}{4}$ fathoms lying West 4 cables from Colison point.

Directions.—To gain the Western roads, either the northern or southern channels may be taken. The passages between the islets are all bold and free of danger, with the exception of that between Scrub and the Dog islands, in which lies the Tow rock with 15 feet water on it, and as it is only 20 yards in extent, it must be carefully approached. The eastern point of Scrub island and the western extreme of Salt island nearly touching S. by W. $\frac{1}{2}$ W., leads on it, and the right extreme or south part of the south-east Seal Dog on with the lowest part of Necker island E. by N. $\frac{1}{2}$ N. is a good cross mark to know its position when coming from the northward or the southward. It lies a little more than a mile W. by N. $\frac{1}{2}$ N. from the West Dog, and the best direction to give, is to keep either Dog or Scrub island close aboard, as they are bold and steep-to.

The Great, George, and West Dogs cannot be mistaken, being three small islets, and the nearest to Virgin Gorda; the two eastern are 250 and 270 feet high, and the western 150 feet. 2 cables westward of the George or northern Dog is the Cockroach rock.

Seal Dogs are a cluster of three much smaller islets, lying close together, N.E. $\frac{1}{2}$ E. about $1\frac{1}{2}$ miles from George Dog, and W. by N. one mile from Mountain point, with clear channels on both sides. The northernmost islet is only 6 feet high, the others 100, and 74 feet.

Scrub island, 450 feet high, lies W.S.W. $1\frac{3}{4}$ miles from the West Dog, and is the easternmost of the numerous small islets and rocks which lie close off the east end of Tortola, and which are only separated from each other by small intricate cuts from one to three cables wide.

SOUTHERN CHANNELS.—Between the south end of Virgin Gorda and the east end of St. John, about 14 miles distant, is a range of very remarkable, small, rugged, and most irregularly shaped islets and rocks. Between most of them are deep and navigable passages leading

into Sir Francis Drake channel, simple and easy of access in the daytime. In the smaller ones, however, a little precaution is necessary in a sailing vessel to guard against the eddy tides and flaws of wind, when coming under the lee of the larger islands.

Round Rock passage is the first channel to the eastward, and by far the best for vessels coming from that direction, as it is easily recognized by the remarkable cay of Fallen Jerusalem a mile to the northward of it. It also offers advantages to sailing vessels, on account of the small islands, which form the weather side, not obstructing the regular breeze.

The passage lies between Round rock, 220 feet high, and Ginger island, and is about half a mile wide, without any danger in it, and both points are bold and steep-to. The tide sets through, generally, at the rate of one knot; the flood south-east, the ebb north-west.

Ginger island is 500 feet high, and the channel between it and Cooper island to the westward is three-quarters of a mile wide. At the southern entrance lies the Carval, a most remarkable small rock, 110 feet high, bold and steep-to; it may be passed close on either side. Ginger island, however, is so lofty, that a vessel is likely to be becalmed under it, and if the tide is strong, she will probably have some difficulty in getting through. In other respects, it is as good as Round rock passage.

Cooper island is $1\frac{3}{4}$ miles long, in a N.N.W. and S.S.E. direction, and at its south end 530 feet high. The passage between it and a small rock awash off the north-east point of Salt island is not a quarter of a mile wide, and should never be attempted by a sailing vessel.

Salt island, at its northern part, is 380 feet high, and the channel farther on between it and the Dead Chest, a small islet 200 feet high, is $1\frac{1}{2}$ miles wide. At about a mile, or two-thirds the way across from the island, is the Blonde rock, a small head with 12 feet water on it, for which no marks can be given; however, by keeping Salt island aboard, within 2 cables, there is nothing to fear. The sea is generally smooth until well outside, and in light winds the anchor may be dropped, if necessary, between the island and the rock.

The passage between the Dead Chest and Peter island is only about a quarter of a mile wide, but as it lies N.W. by W. and S.E. by E., with a good commanding breeze, it may be freely taken from the southward.

Peter island forms an elbow; the eastern arm, 540 feet high, runs north and south for $1\frac{1}{2}$ miles; the northern 440 feet high, east and west $2\frac{1}{2}$ miles; which makes the passage between it and Norman island south-west of it (although a mile wide) so tortuous, that it is seldom taken. Besides, it is obstructed at the southern entrance by the Carrot, a small

patch with 10 feet water on it, lying W. by S. $\frac{1}{2}$ S. nearly half a mile from the Carrot rock (84 feet high) off the south end of Peter island. It had better, therefore, be avoided altogether. These islands are inhabited by fishermen.

Flanagan pass is the westernmost of the southern channels, and in the narrowest part, between the Indian rocks and Flanagan island, it is a mile wide. This passage is the most difficult to enter from the south-eastward on account of the Sta. Monica rock, which lies right in the way. This rock is very small, with only 10 feet water on it and 17 fathoms close to, lying S.S.W. $\frac{1}{2}$ W. three-quarters of a mile from the west end of Norman island, and S.S.E. $\frac{3}{4}$ E. from Flanagan island. Fort Charlotte, on Tortola, in one with the highest of the Indian rocks, N. $\frac{1}{4}$ E., leads to the eastward of it; and Bellevue, the highest hill on the east end of Tortola in one with the Indian rocks N. by E. $\frac{1}{2}$ E., leads to the westward.*

The Indians are four remarkable small pinnacle rocks, 50 feet high, close together, about a cable westward of Pelican island, which lies half a mile from the north-west point of Norman island, and is 180 feet high.

Directions—Approaching Flanagan passage from the eastward haul close round the west side of Norman island, which may be done without fear at the distance of about $1\frac{1}{2}$ cables. But by keeping the southern peak of Cooper island just open of Peter island, a vessel will pass half a mile to the southward of the Sta. Monica rock.

The Bight is a small inlet on the north-west side of Norman island, about three-quarters of a mile deep, east and west, and about a quarter of a mile broad in the narrowest part, affording excellent anchorage. But there is no water on the island, and firewood is scanty.

Directions.—The shores on either side of the Bight are steep-to, and when beating in the only danger to be avoided is the Ring-dove rock, with 15 feet water on it, which lies about $1\frac{1}{2}$ cables from the north-west point of Norman island. The mark to clear it is, Treasure point, the south point of the entrance to the Bight, in line with the summit of the western hill. The wind, however, under the lee of the island is so baffling, that large vessels may have to anchor at the entrance and warp in. Although open to the westward, the island of St. John prevents any sea from setting in, and the holding ground is good. The anchorage outside in Privateer bay is likewise safe, with the regular trade wind.

The above leading mark leads also just clear of the Indians, and having passed them, a vessel may proceed to the westward, or haul to the wind

* See Views A. and B. on Admiralty chart No. 106.

into Sir Francis Drake channel. H.M.S. *Encounter* in December 1876 found $6\frac{3}{4}$ fathoms on the bank lying two-thirds of a mile N.N.W. from Pelican island, where formerly the depth was considered to be 8 fathoms.

SIR FRANCIS DRAKE CHANNEL.—This passage is bounded on the south by the islands just described, and on the north by Tortola and the small islets to the eastward of it. The narrowest part is about $2\frac{1}{4}$ miles wide, between the bluff, which forms the south end of Beef island, and the north point of Cooper island.

Anchorage.—There is anchorage anywhere in this channel to the eastward of a line drawn between Buck island, lying off the south-east end of Tortola, and Dead Chest south of it. The bottom is hard, being a thin bed of sand over coral, and therefore requires a good scope of cable. To the westward of this line, the ground is cut up by rocky knolls.

With strong North and N.E. winds an excellent anchorage will also be found on the south-west side of Beef island, under the lee of the Bluff.

Great harbour is a snug little bight, on the north side of Peter island, about half a mile deep and the same wide, and may be entered without the slightest difficulty at any time; the water is deep close up to the shore, and it has excellent holding ground. The harbour is open to the north-west, but Tortola protects it in that direction, and makes it quite smooth.

Little harbour, a short distance to leeward of Great harbour, is of much the same character, but more confined and more open. There is no water on Peter island.

Guano island.—There is anchorage on the west side of this island, off the north-east point of Tortola, but it should by no means be taken up during the period of the rollers, for on such occasions the sea will break here in 8 or 9 fathoms.

Tides.—In Sir Francis Drake channel there is scarcely any stream, except close in shore, where small vessels may gain some advantage from it when beating to windward.

TORTOLA.

This island is the largest of the Virgin group, being 10 miles in length in an E.N.E. and W.S.W. direction, and its greatest breadth about $3\frac{1}{2}$ miles, with a very irregular outline. Like Virgin Gorda, it is mountainous, mount Sage rising near the west end to the height of 1,780 feet; and its rugged hills rise on all sides somewhat abruptly from the shore. In 1885, the total value of imports was 7,239*l.* and exports 3,488*l.*, with a population of 5,287.

ROAD HARBOUR* is on the south-east side of Tortola, and the only port of entry in the British portion of the Virgin islands. Being completely exposed to the south-east, it may be more properly described as a bay, about $1\frac{1}{4}$ miles deep, three-quarters of a mile wide, and surrounded by an amphitheatre of lofty hills, the spurs of which reach the edge of the shore; mount Sage overlooking it on the west, and Bellevue on the east, the latter 1,270 feet above the sea.

The town stands on the western shore of the bay, and immediately above it a spur of the main ridge reaches 910 feet high, where fort Charlotte formerly stood, but no part of it is now seen. At the foot of this ridge, at the western point of the bay, is a magazine, whitewashed, and very conspicuous, also a flagstaff. On the eastern side, immediately opposite, and scattered along the shore, is the village of Kingston. The anchorage is so confined by the numerous shoals at its entrance and within it, especially on the lee or western side, that it is only adapted for sailing vessels of moderate draught.

Under the lee of the reef at fort Burt point, on the western side of the entrance to the harbour, there is a small well-sheltered vein with a depth of about 10 feet.

Denmark, Scotch, and Lark banks.—There are from 2 to 6 fathoms water on the Denmark banks, the eastern extreme of which lies nearly midway between Hog and Slaney points, the outer extremes of the bay, with the southern of the two trees north of the town, open of the east end of Wickham cay, and the two white houses, near Fish bay, in line.

Inshore of the Denmark banks, in the narrowest part of the entrance between fort Burt point and Kingston, are the Scotch and Lark banks; the latter, which lies 2 cables eastward of the dry reef off fort Burt point, has only $2\frac{1}{2}$ fathoms water on it; the former is about 3 cables from the eastern shore, and has 2 fathoms on it.

The south-west extreme of the Scotch bank lies with the western of the two trees its breadth open eastward of Little Wickham cay, and the right side of the upper white house in line with the left side of the lower white house, near Fish bay.

The eastern extreme of the Lark bank lies with the small mangrove bush on the dry reef in line with a house northward of fort Burt point, and the southern tree its length open eastward of Wickham cay. The northern tree in line with little Wickham cay, N.W. $\frac{1}{4}$ W., clears the bank,

* See Admiralty plan :—Road harbour, with views, No. 1,993, scale, $m = 6\cdot0$ inches ; also chart 106a.

to the eastward. The channel into the harbour lies between these banks, and is about 3 cables wide.

Water.—There is an excellent spring at the cottage near Wickham cay, in the north-west corner of Road harbour, but it does not yield abundantly, and the water is paid for at the rate of eighteenpence a puncheon.

Directions.—Having entered Sir Francis Drake channel, the deep indentation which forms Road harbour and the houses of the town will be readily distinguished. Vessels from the northward had better pass round the west end of Anegada and haul up through the Scrub or Dog island channels. If from the eastward, they may pass either to the northward of Virgin Gorda, or through Round rock passage; and if coming from the southward, through any of the openings to the eastward of Peter island. Vessels of large draught should not run into the harbour without a pilot, and should be careful when standing in for this purpose to keep the Bluff well open to the southward of Tortola. Indeed, outside this line irregular soundings will be met with, and coral patches with only 4 and 5 fathoms on them, and deep water between them. The above mark leads just outside the Denmark banks.

Wickham and Little Wickham cays at the north-west corner of the bay are low, covered with mangrove bushes, and show well against the cultivated ground behind them. A small vessel may, however, run in with Todman peak bearing N.W. by W. and in line with the south-east part of Wickham cay. This mark leads over one of the outer coral patches in $4\frac{1}{4}$ fathoms.

On Half-moon point, eastward of Hog point, is a white house and a wall; and on fort Burt point, at the west side of entrance to the harbour, is a small house with a flagstaff. In a vessel of heavy draught, bring the white house on Half-moon point to bear N.N.W., and stand in on this bearing until at the distance of about 3 cables from the point; or the summit of the second hill (the site of fort Charlotte), within Slaney point, is on with or a little open southward of the flagstaff at fort Burt point bearing W. $\frac{3}{4}$ N.; then run along shore with this mark on in about 13 fathoms water, passing Hog point at $1\frac{1}{2}$ cables, until the northern and larger of the two trees northward of the town, is in line with the east part of Little Wickham cay N.W. $\frac{1}{4}$ W., which mark will lead between the Lark and Scotch banks to the anchorage between Shirley and fort Burt points.*

Having entered the harbour under easy sail, when the flagstaff at fort Burt point bears W. by S. the vessel will be just within the shoals, and

* The directions for large vessels and the marks for the banks are from the Hydrographic Memo., No. 4, issued by Vice-Admiral Sir James Hope, G.C.B., Commander-in-Chief, in the West Indies, May 1865.

may then round to and anchor in 10 fathoms, with Shirley point bearing about N.E., distant 2 cables ; or with the southern of the two trees in line with the east end of Little Wickham cay N.W. $\frac{3}{4}$ W. ; and the small and north-east mangrove bush off fort Burt point on with the flagstaff W.S.W., in from 7 to 13 fathoms water, very uneven bottom.

Handy vessels of light draught, or steamers, having brought fort Burt point on the above bearing, may haul up about N.N.W., and proceed in so far as to bring the south-east end of Wickham cay to bear W. by N., taking care to anchor eastward of the line of the outer part of Slaney point, touching the east extreme of Flanagan island. They will here have room to weigh, and avoid the harbour spit, which stretches out from the westward into nearly the middle of the anchorage.

In leaving the harbour, if bound to the northward, vessels will find little difficulty in beating up Sir Francis Drake channel and so pass out through the Scrub passage, especially if they take the right time of inshore tide ; or they may run to leeward through St. John channel. If proceeding to the southward they had better take the Flanagan passage.

Tides.—It is high water, full and change, in Road harbour at 8h. 30m. ; springs rise $1\frac{1}{2}$ feet, and the lowest tides are in April and May.

Sopers hole is a snug deep little basin formed by the Thatch islands, the Frenchmans cay (400 feet high), and the west end of Tortola. It is a mile in length east and west, about a quarter of a mile in breadth, and in the centre there is a depth of 12 fathoms, which generally decreases to 6 fathoms at half a cable from the shore, over sandy bottom. Between Frenchman cay and Tortola the bottom is muddy, and better holding ground than in the hole.

Directions.—There are two passages by which Sopers hole may be entered ; one between the point, called the West end of Tortola, and Little Thatch island, and the other between the latter island and Frenchman cay. If the first is taken, it should be approached by the Thatch island cut upon the flood, which will shoot a vessel into it, taking care to give the west point of Little Thatch island a berth of a cable's length. If coming from the eastward the latter passage will be the best, as a vessel will have a leading wind, and can luff up close under the west end of Frenchman cay, which is steep-to, and shoot into the basin with either the flood or ebb.

Leaving the hole, pass out to the northward, through Thatch island cut, which is a quarter of a mile wide ; observe, however, that the west end of Tortola is foul to the distance of a cable, but the east point of Great Thatch island, on the opposite side of the channel, is bold, close to the rocks,

Great Thatch island is $1\frac{3}{4}$ miles long east and west, and rises to a peak 680 feet high.

Thatch island cut must not be attempted from the northward against an ebb tide, as the eddies and stream cannot be overcome by a sailing vessel. With the flood, a vessel will have only to steer in through the middle of the channel. If bound into Sir Francis Drake channel, and having rounded the west end of Little Thatch, at a distance of a long cable, she may haul to the wind, and with the tide on the lee beam, she will be set through between St. John and Tortola at the rate of 3 or 4 knots. There is no danger on either shore. Like all the other small narrow passes, a commanding breeze is required to navigate it freely; and a vessel must be prepared to meet the gusts and baffling winds which rush through the valleys of Tortola.

Cane Garden bay is the only place on the north side of Tortola that affords anchorage even for small vessels. Across its entrance is a bar of 12 feet water, inside of which there are 3 and 4 fathoms. In all other parts there is no shelter, even for boats.

ST. JOHN ISLAND. *

This island is 8 miles long east and west, but of irregular breadth. It belongs to Denmark, and its population is about 1,600. Its east end, for the distance of 3 miles, is formed by a narrow neck of land from a mile to less than half a mile across; and from its inner end the coast turns sharp to the southward, forming a deep bight, which terminates at Ram head, a remarkable bold headland, on which are two hummocks, the highest 300 feet above the sea, forming the south point of the island; thence, across to Mary point on the north side, the island is 5 miles broad. The western portion is composed of irregular hills, the highest of which, called the Bordeaux mountains, reaches the height of 1,270 feet. The spurs from the heights terminate abruptly at all the projecting points; and with the exception of a small spot at Coral bay, nothing is seen but hill and dale.

Coral bay lies at the east end of the island, at the bottom of the deep bight just noticed. The eastern side is formed by a lofty promontory, which juts out to the south-east, and terminates at Moors point; thence to the nearest point of the shore westward, the bight is $1\frac{1}{4}$ miles wide, and open to the south-east. The shore within this is cut up into three smaller bays, and in these again are several little creeks. The westernmost of the bays is called Coral harbour, the middle one Hurricane hole, and the eastern one Round bay, which is immediately under the south-west side of the promontory.

* See Admiralty chart No. 106a.

There is no town or village here, but the Moravian missionaries have a small establishment at Coral harbour, from whence good bridle paths traverse the island in all directions. The bay is seldom frequented by large vessels, the produce of the neighbouring estates being carried in droghers for shipment to Santa Cruz or St. Thomas.

Nearly midway between Moors point and Ram head is Buck islet, 3 cables long, half a cable broad, and 84 feet high. Between it and Sabbat point, to the north-west, there is a channel $3\frac{1}{2}$ cables wide; and to the north-east, between it and Moors point, another, one mile broad, which is the best by which to enter the bay.

Hurricane hole is the safest anchorage, for should the wind blow strong in from the south-east, which however seldom happens, a vessel will be partially sheltered. The best berth is in 11 fathoms water, with Turners point S.E. $\frac{1}{2}$ E., and Harbour point W. by S.

Round bay.—The best anchorage is in 13 fathoms, with Moors point S.E. by E. $\frac{1}{2}$ E. about 3 cables distant. There are several patches of about 4 fathoms in the bay, which should be avoided, and should the wind come to the southward of East, a vessel should be ready to move.

Coral harbour.—The anchorage here is smooth, with the ordinary winds, but being on a lee shore, and having a narrow entrance, only small fore-and-aft vessels can work out safely. After luffing up at the entrance, the wind becomes so baffling that a vessel will perhaps be obliged to anchor and warp, should she wish to go higher up.

Water, Otter, Princess, and Borek creeks, in Coral bay, are snug places for clearing out; the sandy points on the southern shores of the two former are very convenient for that purpose. In water creek a large vessel might heave down with safety, as there are from 15 to 20 feet water, close to the shore, or lie moored in perfect security during the hurricane months. Generally, in all these anchorages, the ground under 5 fathoms is rocky, but in deeper water it is sand and mud, and fair holding ground.

Water.—At the head of Coral bay there is a well of excellent water convenient to get at: boats may lay alongside the wharf in smooth water, and a good road enables the casks to be rolled up to it with little labour. Firewood is plentiful, but it is private property.

Directions.—There is no danger whatever in Coral bay for vessels of moderate draught; but in approaching care must be taken to avoid the Eagle shoal, which lies nearly a mile N.E. by E. $\frac{1}{2}$ E. from the outer extreme of Ram head, and three-quarters of a mile S. $\frac{3}{4}$ W. from the east end of Buck islet. The shoal consists of two round patches of coral; the easternmost is 40 yards in diameter, with a depth of only 3 feet on it; the westernmost,

with 12 feet, lies about half a cable from it, and is a little larger. Close to and around them the soundings are 6 and 7 fathoms, and at half a cable to the southward, 13 fathoms. To clear these patches to the southward, keep Buck island (120 feet high, off the south side of St. Thomas) open of Ram head; or do not bring the Head to the southward of West until Turners point, in the middle of Coral bay, is well open eastward of Buck islet, when stand in to either of the anchorages, keeping clear of the shoal patches off Round bay.

Leaving the bay with a commanding breeze (not to the southward of East), a vessel may run through between Sabbat point and Buck islet, and to leeward of the Eagle shoal. In doing so, however, do not bring Sage mountain in Tortola open eastward of the western hummock on Buck islet, till clear of the Eagle shoal, which is about half a mile from the shore.

Tides.—The flood and ebb set across the mouth of Coral bay, the former to the south-west, the latter to the north-east, both at about the rate of three-quarters of a knot an hour. In the bay there is no stream, and the rise of tide scarcely ever exceeds a foot. The time of high water, full and change, varies from 7h. 0m. to 9h. 0m., and at that period the flood commences to run at about 6h. 0m.

Great and Little Lameshur bays are on the south side of St. John, between Cabrite and White points; the former affords good shelter for small vessels in 9 fathoms water, under the lee of Cabrite point at about 2 cables off shore, with Ram head shut in by the point.

Reef bay, a little westward of Lameshur bays, may be known by a remarkable white cliff 135 feet high; on the eastern side it has no good shelter, but there is a good boat harbour within the reef which skirts the shore.

Fish bay, westward of Reef bay, is only a cable wide between the reefs at its entrance, but nearly 4 cables deep; within the bay, the soundings gradually decrease from 4 fathoms to the shore.

Rendezvous bay, to the westward of Dittless point, is 6 cables wide and 5 cables deep, with a depth of from 5 to 6 fathoms, quite free of danger but open to the southward.

Great Cruz bay, at the south-west end of the island, affords good shelter for small vessels; it is a little more than a cable wide at the entrance, and about 4 cables deep. From between the two bluffs at its entrance, the water gradually decreases from 4 to 3 fathoms, and then suddenly to 2 fathoms.

Little Cruz bay is a small cove at the western extremity, but only fit for coasters. There is a village on the shore, and a white building called

the fort. An excellent road leads thence to the upper parts of the island and to Coral bay.

Anchorage.—To the westward of Little Cruz bay there is anchorage in 11 fathoms water, over sand and mud, with the centre of the Two Brothers in one with the west point of Grass cay; and the dry rocks off the east side of Meeren cay in one with the Dog rock.

Directions.—A vessel may approach this anchorage by the passage between Meeren cay and St. John, but it cannot be recommended to sailing vessels on account of the baffling winds under the high land. The best mark to run through it from the southward, is the Carvel rock, off the east end of Congo cay, and the western hummock on Jost Van Dyke in one, bearing N. by E. The reef off Turner bay and the dry rocks of Meeren cay are bold and steep-to; but care must be taken to guard against being set out of the course by the strong tide that runs at the rate of two knots through the channel, the flood to the southward, the ebb to the northward. The best way, however, will be to pass to leeward of Meeren cay, and to stand on until the vessel can fetch the anchorage.

Johnson reef, $1\frac{1}{4}$ miles northward of Little Cruz bay, and a quarter of a mile from Hogsnest point, is the largest of the three Durlow cays, 68 feet high; the other two, 45 and 18 feet high, are about $1\frac{1}{2}$ and 2 cables north-east and north-west of it. Nearly midway between these cays and Whistling cay, 250 feet high, and 2 miles to the eastward, is Johnson reef. It is a quarter of a mile in length, one cable in breadth, lies half mile from the shore, and always breaks. There are $3\frac{1}{2}$ fathoms water one cable north of it, 3 fathoms at about the same distance east and west of it, and between it and the shore irregular soundings varying from $1\frac{1}{2}$ to 10 fathoms.

Francis bay, formed by Mary point, and somewhat protected as far round as north-west by Whistling cay, is about a mile deep and the same in breadth, and affords good anchorage in 9 fathoms water, sand. Between Whistling cay and the shore southward of it is a bank 4 cables in length and $1\frac{1}{4}$ in breadth, fronting the bay, with $3\frac{1}{2}$ to 4 fathoms water on it. The cut between Whistling cay and Mary point is clear, but not easily navigated on account of the baffling winds from the high land.

Leinster bay.—On the northern shore, southward of Thatch island cut, is an indentation of about three-quarters of a mile in length and about a quarter of a mile deep. The western part of it, called Leinster bay, is separated from Francis bay by a narrow neck of land only $1\frac{1}{2}$ cables across, and the shore is here fringed with a coral ledge awash, easily seen. Its eastern part is named Smith bay, where there is a small cay, called Water melon under which a vessel may anchor at about a cable from the shore. This cay is bold and steep-to, and is separated from the island by a channel, one cable

wide, carrying 12 feet water. A vessel must shoot up under its west side, and anchor midway between it and the beach to leeward, which is about 2 cables distant.

There are several other small bays on the northern side of St. John where small vessels may find shelter, but being exposed to the rollers they are not safe.

ST. THOMAS.

This island* is 12 miles long, east and west, one to 3 miles broad, and in its general features very much resembles St. John. It belongs to Denmark, and its population is about 14,000. A lofty ridge runs through its whole length; the most remarkable summit, Signal hill, nearly in the centre of the island, is 1,500 feet above the sea, and West mountain, 1,550 feet, whence large spurs branch off to the north and south, and terminate abruptly on the shore. It is almost surrounded by small islands and cays, in general bold and steep-to, with but very few hidden dangers to guard against.

ST. THOMAS HARBOUR† is near the middle of the south shore of the island, and, being a free port, has a larger commerce than any other in this part of the West Indies, and formerly was annually visited by about 3,000‡ vessels. Its entrance at the narrowest part is $1\frac{1}{2}$ cables wide, from whence it spreads out on either side into a basin, about three-quarters of a mile in diameter, and being open to the southward, it is at all times free of ingress and egress, with the prevailing trade wind. Although of no great extent it is perfectly safe, except in the hurricane months. The anchorage for ships of large draught, however, is confined to a small space, just within the entrance, about 2 cables in extent. It is the principal station of the West India Mail steamers; the moorings of the R.M.S. Company are on the west side of the harbour, and that of the French on the east side. At the north-west part, a canal 13 feet wide has been cut to create a current of water through the harbour from the Gregerie channel; the canal is being widened to 20 feet and is to be deepened to 6 feet. Captain R. Bradshaw, R.N., H.M.S. *Encounter*, in June 1877, remarks—the cutting of this canal has caused a great improvement in the sanitary state of the harbour, which was stagnant before. St. Thomas is now a very healthy place.

* See Admiralty chart:—Virgin islands, Sheet III., No. 106*b*, scale, $m = 1.1$ inches.

† See Admiralty plan:—St. Thomas harbour, No. 2,183, scale, $m = 10.0$ inches.

‡ See note on page 164. In 1884 only 1,595 vessels of a gross tonnage of 718,716 tons entered the port, including 345 steamers.

Docks.—There is a patent slip in the south-west corner of the harbour which can take vessels of 400 tons, if of not more than 8 feet draught forward. A floating dock is moored in the harbour, it is 250 feet long and can be lengthened to 285 feet, with a width inside of 70 feet, depth over sill 20 feet; the largest vessel yet lifted was 290 feet long, and 2,500 tons gross tonnage, but it is capable to lift 3,000 tons. The only factory for large repair of machinery is that of the West India Mail Company, but the Floating Dock Company have a factory for small work. The tug attached to the steam dredger is available for towing purposes. Shipwrights' work is well executed.

The town called Charlotte Amalia is most picturesquely situated along the northern shore of the harbour, and on the sides of three remarkable rounded spurs, which branch off to the southward from the main mountain ridge. It contains about 12,000 inhabitants; in 1884 its imports were valued at 446,286*l*.

The westernmost spur is called French hill, the highest house on which is 170 feet above the sea. The centre one, Judge Berg's, is crowned by a large square residence, 284 feet above the sea. On the eastern spur, named Kiar, there is a remarkable stone tower 240 feet above the same level, and immediately beneath it is fort Christian and the Water battery which command the harbour, but the latter is not an imposing object. To the eastward of the town another hill rises abruptly from the shore, called Frederiksberg, on the summit of which stands a large house by itself, with a tower near it 250 feet above the harbour:* and overlooking

The following Table of Rates for vessels was established in 1867:—

Size.		For the first day.	For each of the next five.	For every day after the first six.
From 60 to 100 tons -	-	50 cents per ton	25 cents per ton	20 cents per ton
101 „ 200 „ -	-	60 „ „	25 „ „	20 „ „
201 „ 300 „ -	-	70 „ „	25 „ „	20 „ „
301 „ 400 „ -	-	80 „ „	25 „ „	20 „ „
401 „ 500 „ -	-	90 „ „	25 „ „	20 „ „
501 „ 600 „ -	-	100 „ „	25 „ „	20 „ „
601 „ 700 „ -	-	110 „ „	25 „ „	20 „ „
701 „ 800 „ -	-	120 „ „	25 „ „	20 „ „
801 „ 900 „ -	-	130 „ „	25 „ „	20 „ „
901 „ 1,000 „ -	-	140 „ „	25 „ „	20 „ „
1,001 „ 1,100 „ -	-	150 „ „	25 „ „	20 „ „
1,101 „ 1,200 „ -	-	160 „ „	25 „ „	20 „ „

* See view on the plan of harbour.

it, on the mountain ridge, is the country residence of Louisehoe. From thence to the southward, a small deep valley, at the east end of the basin, separates the spurs from the lofty ridge of hills that form the eastern side of the entrance, and which terminate abruptly at Möhlenfels point.

Supplies.—Coal.—There are no wells or fountains in the town of Charlotte Amalia; but rain water can be purchased from tanks brought alongside. Firewood is scarce, but coal of any kind can always be obtained with facility, day or night, alongside wharves or by barges, the German Company's wharf has 27 feet at low-water and an English Company's has 22 feet.

LIGHTS.—A lighthouse, painted white, stands on Möhlenfels point, and shows, 118 feet above the sea, a *fixed* white light, visible 12 miles.*

Two small lights are shown from King's wharf landing place; the eastern one is *green*, and the western *red*.

Frenchman cap.—Approaching St. Thomas harbour from the eastward, two small islands will be observed on the south side of the island, named Frenchman cap, and Buck island. Frenchman cap is the southernmost, and lies S.S.W. $\frac{1}{3}$ W. $4\frac{1}{2}$ miles from Dog island, at the eastern extreme of St. Thomas. It is a remarkable islet, $1\frac{1}{2}$ cables long, one cable broad, and 195 feet high, covered with long grass, and steep-to. On the north side there are 5 to 9 fathoms water at 2 cables from the islet, and on the south side 24 fathoms a cable off.

Buck island is a small islet about 120 feet high, partially covered with brushwood, lying about $1\frac{1}{2}$ miles from the nearest part of St. Thomas, and S.E. $\frac{3}{4}$ S. 3 miles from the lighthouse. It is steep-to on its south side. Off the west end a shallow ledge extends to the distance of half a cable; and on the north side the depth is 5 fathoms at the same distance. Good landing will be found in the little bay at the west end.

Packet rock is a small coral shoal about half a cable in extent, with a depth of only 5 feet on it, lying about $1\frac{1}{10}$ miles to the northward of Buck island, and half a mile from the nearest part of St. Thomas. The sea does not always break over it, and it cannot be seen until close to. To the south and west it is steep; on the eastern side the depth gradually increases to 7 fathoms at three-quarters of a cable from the rock. The ground inside the shoal is clear, with a depth of 8 and 9 fathoms, sand and rock, extending from Long point as far west as Coculus bay, $2\frac{1}{2}$ cables south of which there is a small head with only 9 feet on it, but it is out of the line of track, and can be easily avoided.

When on the western end of the Packet rock, the flagstaff on Möhlenfels point and Contant mill will be in one, bearing N.W. by W., and the remarkable needle-pointed rock at Patrick point will touch the southernmost house on the northern saddle of Great St. James island, E. by N. $\frac{1}{2}$ N.

The Triangles, on the east side of entrance to the harbour, lie nearly midway between Green cay and Möhlenfels point. They consist of three small rocks, forming a triangle; the eastern rock uncovers 3 feet at low water, the northern rock one foot, and the south-west and outer rock 2 feet, and this latter is nearly 4 cables from the shore. Banana point (the north end of Water island), just open of Cowell point, (the south-west point of the entrance to the harbour,) bearing N.W. by W., leads close to the south-west of the Triangles, and northward of the 17-foot rock, south of them.

A small detached coral rock, about 35 yards in diameter, lies with the two western rocks of the Triangles in line bearing North, distant $1\frac{1}{2}$ cables from the outer. It has 17 feet least water on it, and 7 fathoms close to. A *black* buoy with staff and ball is placed about half a cable southward of the rock, with the lighthouse at Möhlenfels point bearing N.N.W.; and the south point of Water island W. $\frac{1}{2}$ S. There is a patch of $5\frac{1}{2}$ fathoms about half a cable to the eastward of the 17-foot shoal, and another at the same distance to the southward.

Rupert beacon open of Möhlenfels point, N.N.W., leads westward of these dangers; but a vessel of large draught on nearing the port from the eastward, should keep East Gregerie channel well open until the leading mark into the harbour is on.

Point knoll is a small coral head with 3 fathoms water on it; it lies S.W. $\frac{3}{4}$ W. from the lighthouse, and nearly three-quarters of a cable from the nearest part of Möhlenfels point. The highest part of Rupert rock and Kiær tower in one, bearing N. by W., leads over it.

Rhode bank lies N. by W. $\frac{1}{2}$ W. a quarter of a mile from Point knoll, and consists of three small coral heads lying close to each other, with from 15 to 18 feet water on them. At the distance of nearly half a cable north of the bank there are from 24 to 26 feet water; three-quarters of a cable to the south-west 24 and 27 feet; and within it 27 feet, decreasing to the shore. When on the north end, the highest part of Rupert rock will be in line with the east end of Government house, N. by W. $\frac{1}{4}$ W., and the north end of Revenge sand (Water island) just open of Cowell point W. by S. Kiær tower in one with the western part of Rupert rock N. by W., crosses the western edge in 23 feet; it is marked by a *black* conical buoy, with staff and ball.

Rupert rock is 13 feet high, whitewashed, and cannot be mistaken. It lies about half a mile northward of the lighthouse and a quarter of a mile E.N.E. of Frederik point, at the narrowest part of the channel into the harbour. At its base are some large boulders, which toward the west become just covered with the water, and extend out to the distance of 50 yards. On the westernmost of the rocks is an iron beacon with staff and ball painted white and 20 feet high. On the south they are steep to at 30 yards off. Between them and Havensight point there are only from 12 to 15 feet water.

Between this rock and Rhode bank is the Quarantine ground, in which the depth gradually decreases to the shore from 5 to 3 fathoms. The above are all the dangers on the eastern side of the entrance.

Frederik knoll is a rocky patch, on the western side of the harbour entrance, about half a cable from the shore, and having from 15 to 18 feet water on it. No good mark can be given to avoid it, and it is the only danger on this side.

Scorpion rock lies immediately in the way at the entrance to the harbour, between the lighthouse and Cowell point. It is a small coral rock, not more than 27 yards in length and 10 yards in breadth, with two or three heads higher than the rest, on which there are 20 feet water at the lowest springs in May; it is marked by a *red* buoy with staff and ball. At about half a cable westward of the rock there are from 26 to 28 feet water, and nearly half a cable eastward from 28 to 30 feet. When on the shallowest part, the east end of the roof of the highest house on French hill will be seen just over Frederik point, bearing N.N.W. $\frac{1}{4}$ W., and Cowell point just clear of the south end of Sand bay (Water island) W. $\frac{1}{4}$ N.

Anchorage.—The best anchorage in the harbour for a ship of large draught, and a good position for weighing, is with the highest part of Rupert rock in one with the lighthouse, and Long bay fairly open, in $5\frac{1}{2}$ fathoms. There are several patches of coral in the north-east part of the harbour, the shoalest of which has 16 water on it. These patches are being removed by blasting.

Caution.—Care must, however, be taken to observe the port regulation, which forbids a vessel anchoring in front of the fort, so as to mask it, or prevent it from taking a range of the whole entrance of the harbour. The sterns of vessels anchoring to the eastward must consequently not be more westerly than to bring the flagstaff of the fort to bear N.N.W., and the bows of vessels anchoring on the western side of the harbour not more easterly than to bring it N. by E. Merchant vessels discharging cargo

lie off the town to the westward of the fort ; those ready for sea preparatory to sailing, warp into Long bay, to the eastward of it.

Directions.—Vessels approaching St. Thomas harbour from the eastward, and intending to take the channel between Buck island and Packet rock, should bring the south extreme of Dog island in one with Ram head (St. John), bearing E. $\frac{1}{2}$ N., which mark will lead half a mile to the southward of the Packet rock, and in mid-channel.

Continue steering about West until Judge Berg's house opens westward of Möhenfels point ; then steer for Frederik battery until the leading marks come on, viz.—The tower of the Danish church in line with the centre of the Water battery barracks bearing N. $\frac{3}{4}$ W. : haul up on this mark, which leads between the Scorpion rock and Rhode shoal, and half a cable westward of the foul ground off Rupert Rock, which last having passed, anchor as convenient. Should the Water battery barracks be hidden by a vessel lying before them, the highest part of Rupert rock in one with the portico of the house on Frederiksberg N. $\frac{1}{2}$ E., which will lead half a cable eastward of the Scorpion, and when Green cay is just shut in by Möhlenfels point a course may be shaped to pass about half a cable westward of Rupert beacon. The tower of the Danish church is low and square ; and the Water battery barracks consist of a block of one-storied buildings surrounded by a double verandah.

Steamers entering from the westward may go in leeward of the Scorpion rock, by steering with Frederik battery and Kiær tower in one bearing North, until Cowell point touches the south end of Sand bay (Water island) bearing West, when they will be abreast the Scorpion, and may then shape a mid-channel course, taking care to give Frederik point a berth of a cable's length.

A pilot may be readily obtained by making the usual signal.

At night there is no difficulty in entering the harbour, but it will be better to pass between Buck island and Frenchman cap, and having brought the light to bear North,—to avoid the Triangles and the 17-foot rock south of them,—stand boldly in towards the entrance. The Rupert rock, being whitewashed, will soon show itself.

When leaving the harbour a vessel will generally have a leading wind, especially if she weighs before 9 a.m. ; for although there is no regular land wind, it frequently happens that the breeze slackens and inclines a little out, between sunset and the above hour ; and this is observed at all the lofty islands. Use the same leading marks to avoid the shoals in going out as in entering, and if the wind should happen to be to the southward of East, she must run to leeward of the Scorpion ; therefore, when in steering out, the south part of Water island comes open of Cowell point S.W. $\frac{1}{2}$ W., keep away, taking care not to shut in the north end of Long

bay beach with the west end of Rupert rock, until Sand bay opens out clear of Cowell point, when the vessel may be hauled to the wind.

Tides.—It is high water, full and change, in St. Thomas harbour, between 7h. 0m. and 9h. 0m., and the rise seldom exceeds one foot at springs. The mean level of the sea is a foot lower in April and May than at other periods of the year.

GREGERIE CHANNEL, immediately westward of St. Thomas harbour, is formed by Water island to the south, and the shore of St. Thomas on the north. It makes a complete elbow, sweeping round from the west, northerly, to the east. The eastern arm, named East Gregerie channel, trends N.W. and S.E., and is free from danger, with a depth of from 6 to 7 fathoms. At its entrance, between Cowell and Sprat points, it is half a mile wide, and at the elbow or north-west end, between Careen hill and Banana point, a quarter of a mile. The south-west arm, named West Gregerie channel, is about the same length, and a quarter of a mile wide, with a depth of from 6 to 9 fathoms. At the head or elbow it opens out into a basin half a mile in diameter, well sheltered, but obstructed in the centre by the Gregerie bank and Sandy point rock.

Gregerie bank is a small patch of dead coral and sand, about 80 yards long and 40 yards wide, and the least water on it is 15 feet, which depth lies with Cowell point just shut in by Banana point, and Saba island by Regis point.

Sandy Point rock is small, with only 2 feet water on it, and lies near the end of the shallow sand spit, which runs off a cable to the north-west from Sandy point. When on the rock, Cowell battery will be seen just over Banana point. The distance between it and the Gregerie bank is less than a cable, with a depth of 22 feet. In the channel to the northward of the Gregerie the depth is not less than 27 feet at about half a cable from the bank.

Anchorage.—Anchorage will be found anywhere in Gregerie channel clear of the shoals. The safest and most convenient spots are in the elbow and south-west arm, for a vessel will there be more sheltered from the swell which rolls in from the eastward, and will have a steadier breeze and more room for weighing. A good berth will be found either to the north-east or west of the Gregerie bank; if the latter, Kiaer tower should be just over the northern foot of Careen hill.

Directions.—Sailing vessels wishing to take up an anchorage in Gregerie channel had better enter by the eastern arm, and leave it by the western. To sail through, run in boldly in mid-channel, and when nearing Gregerie bank keep Cowell point open of Banana point, until

Kiær tower begins to open to the northward of Carcen hill; then, hard a starboard, and steer down the centre of the western arm, in which there are no dangers. This will lead about half a cable northward of the Gregerie bank, in 27 feet, but the turning of the elbow is sharp for a long vessel.

To take the channel between Gregerie bank and Sandy point rock, when Kiær tower is just open to the southward of Carcen hill, bear up and bring Regis point and the south point of Saba island in one, S.W. by W. $\frac{1}{4}$ W., which will lead across the bar in not less than 22 feet water; but remember that the channel is not a cable wide, and sharp to turn.

Tides.—The flood in Gregerie channel sets through to the eastward at the rate of about half a knot at springs; the ebb with the same force in the opposite direction.

Great Krum bay is a small inlet running up between two lofty hills at the western side of the entrance to the south-west arm of Gregerie channel. It is about 4 cables deep and 70 fathoms wide in its narrowest part, with a vein of water in the centre shallowing from 40 to 20 feet. This bay is used as a convenient spot for breaking up vessels.

Mosquito bay, close to the west of Great Krum bay, is about half a mile wide between Mosquito and Red points, half a mile deep, and open to the southward. Off the latter point a narrow rocky ledge extends a long quarter of a mile to the S. by W., and on its extreme end is a small coral head called Red point shoal, with only two feet water on it, and steep-to. Within the bay the depth from 5 fathoms gradually decreases towards the shore; it is only used by small vessels.

Porpoise rocks.—Three small rocks, just out of water, and connected by a shallow ledge, compose this group, which occupies a space of about a quarter of a mile north-east and south-west. They are steep-to and lie West about two-thirds of a mile from the south-west end of Water island, with a deep and clear channel between.

Water island anchorage.—There is excellent anchorage under the west side of Water island for vessels of the largest draught. If intending to anchor here, run in about midway between the Porpoise rocks and the island, and come to in 9 fathoms water, as soon as the town of St. Thomas is open to the northward of the island; or with the south extreme of the island S.E. by S., and the north end of Drift bay beach E. by N., distant half a mile.

South-west road, between Flat cays and Perseverance bay, affords an excellent anchorage with the wind as far to the southward as E.S.E.

A vessel may enter it either by the passage between Flat cays, 28 feet high, and Red point shoal, by that between Saba island, 185 feet high, and Flat cays, or by passing to the westward of the dry rock under Saba. The two last routes require no particular directions, being quite clear of danger. The rocks awash, lying nearly 2 cables eastward of the south point of the largest of the Flat cays, almost always break; but to avoid Red point shoal, keep Flag hill peak (on the east side of the harbour of St. Thomas) open to the southward of Mosquito bay point, until the south points of Flat and Turtle Dove cays are in one S.W. $\frac{1}{2}$ W., when haul up, and anchor as convenient. Mosquito point and Flag hill peak in one E. $\frac{3}{4}$ N. leads half a cable southward of the Red point shoal in 9 fathoms water.

Water.—A small mountain stream empties itself into the sea at the first little beach in Perseverance bay, westward of Black point; it is, however, private property, and a small remuneration is expected for its use. The spring issues from the side of the hill at a considerable elevation above the sea, and in dry weather will not yield more than 4 tons a day; but after rains thrice that quantity can easily be obtained by means of a hose, without removing the casks from the boat. The water has at first a disagreeable soft taste, but improves and becomes excellent, after being in the tanks about a fortnight.

Tides.—In-shore there is scarcely any stream, but between Flat cays and Saba island, the flood during springs runs to the E.S.E., at the rate of about one knot, and the ebb in the opposite direction, with the same velocity.

Great North Side bay is the only bight on the north side of St. Thomas which requires to be noticed. It is $1\frac{1}{2}$ miles deep and half a mile wide, and its eastern side is formed by a long narrow tongue of land, which terminates to the north-west at Picara point, nearly mid-way between Hans-Lollik and the Brass islands; being, however, open to the north-west and consequently exposed to the rollers, it is only safe for small vessels, and they will find good anchorage anywhere under the weather shore. In entering care must be taken to avoid the Ornen rock, with 9 feet water on it, which lies N.W. by W. $\frac{1}{2}$ W. half a mile from Picara point. By keeping Dutchmans cap open between the two Brass islands, a vessel will pass clear to the northward of it.

St. James bay is formed between the east end of St. Thomas and Great St. James island, and contains excellent and secure anchorage,—except in hurricane season—being sheltered from all points but the south-west.

Directions.—In entering St. James bay, stand in boldly from the southward, giving the Stragglers a berth of half a cable, and anchor in 7 fathoms water, with Fish cay, E. by N. $\frac{1}{2}$ N., and the south extreme of the Stragglers S.S.E. $\frac{1}{2}$ E., distant about $3\frac{1}{2}$ cables. Should the wind happen to be well in from the southward when leaving the bay, and the vessel cannot conveniently work out between Cow rock and the Stragglers (which, however, may be done on the flood), she may run out between the Cow and Calf and Deck point, in which channel there are irregular soundings of from 5 to 9 fathoms.

The Sound is the name given to the space between St. Thomas and St. John and a chain of small islands, from 200 to 300 feet in height, which bounds it on the north side; forming an excellent roadstead, about 2 miles in extent east and west and $1\frac{1}{2}$ miles north and south, quite secure against rollers, and all winds except from the southward, which only blow in the hurricane months. The tides in it, however, are so strong, that if intending to remain any time it will be better to moor, to avoid a foul anchor.

The Brothers are two small barren rocks, 20 feet high, lying in the middle of the Sound. A ledge runs off gradually from their north side, deepening to 5 fathoms at the distance of $1\frac{1}{4}$ cables; they may be approached on their south side to the distance of half a cable.

Directions.—The Sound may be entered by the channels between the islands to the northward, or by the southern channel between Dog island, at the east end of St. Thomas, and St. John, the entrance to which is about $1\frac{1}{2}$ miles wide. There is no danger in this channel, and a vessel can sail boldly in, keeping to the westward of the reef off Turner bay and Meeren cay, passing on either side of the Brothers according to the set of the tide and direction of the wind, and anchoring, as most convenient, to the northward of them.

Northern channels into the Sound.—The easternmost passage lies between Jost Van Dyke and Tortola, and presents no danger whatever; a vessel has only to steer through in mid-channel, where the least water is 9 fathoms.

Jost Van Dyke lies about $3\frac{1}{2}$ miles from the north-west side of Tortola. It is $3\frac{1}{3}$ miles long, east and west, $1\frac{1}{4}$ miles broad, lofty and rugged, bold and steep-to, and towards the east end it rises to the height of 1,070 feet. On the south side are two small bays called Great and Little harbours; the former about half a mile deep, with from 3 to 8 fathoms water in it: the latter, more snug, has 6 fathoms about one-third of a mile within the entrance, but they are only fit anchorages for small vessels.

Little Jost Van Dyke is a mile in length, half a mile in breadth, 370 feet high, and is separated from the east end of the greater island by a shallow ledge a cable wide. Close to its east end is a small islet named Green cay, 110 feet high and $1\frac{1}{2}$ cables long; south of the cay there is a small dry rock, and shallow water for nearly a quarter of a mile.

Sandy cay lies south nearly a mile from Green cay, and three-quarters of a mile from the east end of Jost Van Dyke. Its east end is 66 feet high, but to the westward it terminates in a low sand-spit, and both ends are foul to the distance of a cable. The channel between it and Jost Van Dyke is half a mile wide, but the Jost Van Dyke shore, which is steep-to, must be kept aboard. This cay is about $2\frac{1}{2}$ miles westward of Cane garden bay in Tortola, and with Green cay bounds the west side of the channel.

Great Tobago lies 2 miles westward of Jost Van Dyke, and is three-quarters of a mile long, north and south, half a mile broad, and 540 feet high. A small rock awash, and steep-to, lies about half a cable from the north point. The south side of the island is fringed with coral to a short distance, but elsewhere the shore is steep-to close to the cliff. At a quarter of a mile from the south-west side there is a remarkable small perpendicular rock, named Watson rock, steep-to, and 90 feet high.

The Mercurias rock is the only danger in the channel between Jost Van Dyke and Great Tobago; it is small, bold and steep-to, and has 7 feet water on it. From the rock the north point of Great Tobago bears W. by N. $\frac{1}{2}$ N., three-quarters of a mile; the highest part of Carval rock will be seen nearly on with the highest hill at the west end of St. John, S. by E. $\frac{1}{3}$ E., and Sage mountain nearly in line with the south-west extreme of Jost Van Dyke E. by S. Between the rock and Great Tobago the depth is from 7 to 8 fathoms, and the same depth will be found for two-thirds of a mile south-east of it. In running through this channel, the Jost Van Dyke shore must be kept aboard, which can be done without fear.

Little Tobago is a small islet lying S.W. about a mile from Great Tobago; it is nearly half a mile in length, a quarter of a mile in breadth, and 280 feet high. There is a safe and clear channel between these islands, but, as nothing would be gained by using it, it will be better to pass through either of the others; should it be necessary, however, to take it, keep a little to windward or eastward of little Tobago, taking the bearing of Watson rock, to avoid the King rock, which is awash, and may be seen half a mile from a vessel's deck. It is bold and steep-to, and between it and Great Tobago the depth is 6 and 7 fathoms. From the rock, the south point of Little Tobago is in one with the north extreme of the small low

rocks off the north end of Little Hans-Lollik, bearing W. by S. southerly, and Watson rock N.N.W. $\frac{1}{4}$ W. distant half a mile.

Hans-Lollik and Little Hans-Lollik.—Hans-Lollik is a bold rocky islet, 720 feet high, $1\frac{1}{4}$ miles long, N.N.W. and S.S.E., nearly three-quarters of a mile broad, and lies $3\frac{1}{2}$ miles to the south-west of Little Tobago. At 2 cables to the northward of it, and connected by a coral ledge nearly dry, which also skirts the east side of the island, is Little Hans-Lollik, half a mile long, nearly one quarter broad, and 220 feet high; and a cable north-west of which is another small, low, rocky islet, with a sunken rock close off its north side. These islets are bold and steep-to on their west side, but to the southward is the Hans-Lollik rock, which is awash about a cable in diameter, and lies S.E. by E. $3\frac{1}{2}$ cables from the south point of Hans-Lollik, with from 3 to 5 fathoms water in the channel between; it is steep-to on its south side, and visible a mile from a vessel's deck.

Directions.—The channel between Hans-Lollik and Little Tobago is free of danger, but being to leeward of the middle or inner channels to the Sound, a vessel may have to beat through, and this can only be accomplished with the flood tide. It is therefore more useful to vessels running through Sir Francis Drake channel, and northward of St. John, with the wind well to the northward; or to those leaving the Sound. Should the wind be so far to the northward that they cannot fetch through, they may take the channel between St. Thomas and Hans-Lollik, which is a mile wide.

Windward or Inner North Passage lies between the Lovango and Durloe cays, and is about 3 cables wide. The Durloe cays are three small islets near the north-west point of St. John, and cannot well be mistaken. On the west side of the channel are the Carval rock,—2 cables off the east end of Congo cay, which lies close to the north-east end of Lovango cay,—and the Blunder rock awash, 2 cables from the east end of the latter cay.

Directions.—The largest vessel may take the passage between the Lovango and Durloe cays, at any time of tide, provided she can depend on keeping a four-knot breeze, for the stream runs at the rate of $2\frac{1}{2}$ knots. The pilotage is simple, the eye being a sufficient guide, for every danger will be seen. Should the wind fall light, she may anchor at a moment's warning; under 10 fathoms the ground is rocky.

In this channel there is a strong race with the ebb running against the wind, which appears like broken water. Through the Durloe cays, and between them and Hogsnest point, there are deep and clear passages, but it will be better to pass between them and Lovango cay. Having run to

the westward of the Durløe cays, steer for the anchorage in the Sound ; or if bound on, pass between the Brothers and Meeren cay, hauling up on rounding the latter.

Between Lovango and Mingo cays there is a 3-fathoms boat channel ; it is narrow, and the tides in it strong.

Middle Passage, between Grass and Thatch cays, is about 3 cables wide, but being to leeward, is mostly used by vessels leaving the Sound. It may, however, be taken from the northward on the ebb, provided a vessel can lay up S.E. ; and she may work through from this, being careful to avoid a small rock awash, lying W. by N. $\frac{1}{2}$ N. rather more than three-quarters of a cable from the west end of Grass cay. This danger can easily be seen from aloft, and as it lies on a line, with the northern parts of Congo and Grass cays in one, bearing E. by N. $\frac{3}{4}$ N., in coming from the northward this will be a warning of approach ; and going through from the southward, when Congo is seen northward of Grass cay, the vessel may be hauled to the wind.

Tides.—In the Middle passage the flood sets to the southward at the rate of about 2 knots at springs, and takes a south-east direction inside ; the ebb runs in the opposite direction with the same strength.

Leeward Passage, between Thatch cay and the north side of St. Thomas, is 4 cables wide, and has no danger in it whatever. The flood sets through to the eastward at the rate of about 2 knots, and the ebb with the same velocity, in the opposite direction. Being so far to leeward, it is only used by vessels running through from the eastward ; the west point of Thatch cay may be rounded close, when they can haul up, passing either eastward or westward of Hans-Lollik.

If the channel between Hans-Lollik and the Ornen rock is taken, keep the west point of Thatch cay in one with Shark islet S.E. by E., until clear of Hans-Lollik rock. Shark islet is small, rocky, 40 feet high, and lies near the shore at the east end of St. Thomas.

Current Hole and Passage is between Current hole point, at the east end of St. Thomas, and Great St. James island nearly 2 cables distant. The passage is divided nearly in the centre by the Current rock, 15 feet high, and between it and St. Thomas there are only 9 feet water ; but on the St. James side a vessel will carry 23 feet through a small vein not quite half a cable in breadth, and a cable in length. The tides rush through the opening with such violence, as to cause a strong race, and gives the name of Current hole to the small bight between it and Cabrita point, the eastern extreme of St. Thomas.

The course through the channel is S.S.W. It is quite safe, and may be useful to vessels running to the southward through the Sound, when

unable to weather Dog island and rocks. As soon as Current rock is passed, steer out S.S.W. $\frac{1}{2}$ W., passing between Cow rock and the Stragglers, off the south-west point of Great St. James, all of which are steep-to, and well above water.

Tides.—The flood sets through Current passage to the southward at the rate of at least 3 knots, and the ebb with equal force to the northward; and as it should be taken by a sailing vessel on the ebb, there must be a steady, commanding breeze to stem it.

St. James cut.—A depth of 20 feet may be carried through this cut, between Great and Little St. James, passing on either side of the Welk rock, which lies on the east side of the islands. The channel is on the Great St. James side, but so circuitous as to be by no means safe. It should only be attempted even by small sailing vessels from the eastward, with the wind well aft, and against the ebb, to give time to alter the course, and then only in a case of necessity. The eye will be the best guide.

Dog Island cut with only 3 fathoms water, and having a 9-foot rock in the middle of it, is too dangerous for a sailing vessel to take.

Brass islands are two small islets close off the north side of St. Thomas, and about 3 miles westward of Hans-Lollik. They are each about three-quarters of a mile long in a north-west and south-east direction, one third of a mile broad, the inner Brass is 260 feet, and the outer Brass 430 feet high. Between the inner islet and St. Thomas there is a 5-fathom channel, 2 cables wide; and between the two islets there is one of 7 fathoms, 3 cables wide, but they are only safe for coasters. The flood sets between them to the south-west at the rate of about one knot, but the ebb is scarcely perceptible. Under the inner Brass there is secure and well sheltered anchorage for coasters in 6 or 7 fathoms water, at about half a mile from the shore, with the north end of the islet N. by E.

Lizard rock is a small rugged islet, 15 feet high, and steep-to on all sides; it lies about three-quarters of a mile westward of the inner Brass island.

West and Salt cays are only separated from the west end of St. Thomas by a small boat channel. They are each about half a mile long in a north-west and south-east direction, and lie close together; Salt cay, the outer one, is 250 feet high, bold, and steep-to.

Dutchmans Cap, nearly a mile to the northward of Salt cay, is a remarkable small rocky islet, rising abruptly from the sea to a peak 270 feet high, with deep water close around. At about half a cable from its south-west side there is a small rock 3 feet out of water. Between it and Salt cay the soundings are from 14 to 18 fathoms.

Cockroach island is a small rocky islet of irregular shape, with a flattish summit, and perpendicular cliffs 155 feet high. It is of nearly the same size as Dutchmans cap, and lies about $1\frac{1}{3}$ miles northward of it. The passage between is quite free of danger. On the north side of the islet the depth is 20 fathoms at a cable off, and on the south side 10 fathoms at $1\frac{1}{2}$ cables.

Cricket rock lies E.N.E. half a mile from Cockroach island, and is the most northern islet of the group. It is 45 feet high, bold and steep-to, and there is a clear channel between the two islets.

Savana island lies S.W. about $1\frac{1}{2}$ miles from Salt cay. It is nearly a mile in length, half a mile in breadth, and the highest part is 270 feet above the sea. It is uninhabited, but used for breeding goats. On its west side it is steep-to, having 16 fathoms a cable from the rocks. Some detached dry rocks extend nearly a cable from its south point, with 15 fathoms close to their outer edge; there are also some straggling rocks 8 or 10 feet high, and steep-to, extending about a quarter of a mile off its eastern side.

Turkey cay, in the middle of Savana island passage, is a small narrow islet $1\frac{1}{2}$ cables long, from 20 to 30 yards broad, 80 feet high, and surrounded by deep water except at the south end, where there are 3 fathoms, but nearly close to. About half a mile to the south-east of the cay is the little islet named Salt-water-money rock, 10 feet high, also steep-to with a clear channel between.

Nearly half way across the passage between the north end of Savana island and the west end of Salt cay, there is a coral patch with only 5 fathoms water on it, but in all other parts the depths are from 13 to 16 fathoms.

Directions.—The above channels may be safely navigated by sailing vessels; the only caution necessary being to guard against the tides, which in the Savana passage run at the rate of 3 knots, and in the others about one knot. With the ordinary east wind a vessel will scarcely be able to stem the ebb which sets to the north-west in the passage; and it will be better in beating up, to haul close round the south end of Savana island, and stand well to the southward, so as to avoid the strength of the in-shore tide. With the flood it will be an advantage to take this passage, as by keeping along shore, the whole of its strength will be gained, and smooth water. From the west end of St. Thomas to Perseverance bay the bank is quite clear, and the shore steep-to, close to the rocks.

Sail Rock,—so called from its great resemblance to a vessel under sail,—rises precipitously from the sea to the height of 125 feet. It lies S. by W. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles from Savana island, and is a remarkable object

from off the harbour of St. Thomas. It is about 100 yards in diameter, quite barren, with a light greyish appearance, from its being frequented by birds at certain seasons. Nearly a cable to the W.S.W. of it there is a small rock nearly awash, the only danger near it; on all other sides it is bold and steep-to.

CULEBRA.

Sometimes called Passage island,* from its lying in the main channel between St. Thomas and Puerto Rico, is about 6 miles in length E.S.E. and W.N.W., but varies considerably in breadth, from its very irregular outline; at the east end it is 3 miles broad, but to the westward it terminates in a point. It is uninhabited, of moderate elevation, broken and rugged, thickly wooded, with scarcely a level spot on its surface, and near the centre rises to the height of 650 feet. The northern shore is bold and steep-to, the 20-fathoms line of soundings running parallel to it at the distance of $1\frac{1}{2}$ miles; and half a mile within it is a coral ledge with 6 and 8 fathoms water on it, which extends from N.E. cay to within $1\frac{1}{2}$ miles of the north-west point of Culebra, within this ledge the water deepens again to 12 and 13 fathoms. A strong easterly set is at times experienced in the Culebra channels.

On all other sides there are small islets and reefs which shelter good anchorages, and at the east end there are two excellent harbours. Fire-wood may be cut on any part of the island, but there is no water.

N.E. cay, about half a mile from the north-east shore of Culebra, is oval shaped, $1\frac{1}{4}$ miles long E.S.E. and W.N.W., half a mile broad in the centre, 340 feet high, and thickly wooded. North $1\frac{1}{2}$ cables from the east end is a remarkable small rocky islet called Bird cay, 60 feet high; and at about a mile to the north-east of this end are the Shark and Whale rocks, two small rocky islets 16 and 10 feet high; S.E. 4 cables from these are the Palada cays, two small rocky islets, 80 and 84 feet high, and steep-to.

Culebrita islet lies to the south-east of N.E. cay, and at about the same distance as the latter from the shore. It is of irregular shape; a mile in length north-west and south-east, nearly two-thirds of a mile in breadth, 260 feet high, and thickly wooded. From the south end a reef, nearly dry, extends in a S.S.W. direction for $2\frac{1}{2}$ miles, and protects the Sound and Mangrove harbour. Three cables from Pond point (the north-west end of the islet) is Davy cay, a small rocky islet 30 feet high.

Light.—From a lighthouse 45 feet high, and 245 feet above the sea level erected on the highest part of Culebrita island, a *fixed* white light is exhibited, visible in clear weather about 12 miles.

* See Admiralty chart : —Culebra or Passage island, No. 2,677; scale, $m = 3\cdot0$ inches.
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The Sound.—Excellent anchorage will be found within the cays and islands just described, but the best, called the Sound, is under the lee of the reef, in front of Mangrove harbour, a clear space $1\frac{1}{2}$ miles in length and half a mile in breadth.

The best anchorage in the Sound is with the extreme west end of Davy cay touching the east end of Bird cay N. by W. $\frac{1}{2}$ W.; and the south-east end of Culebrita E.N.E., in 10 or 12 fathoms water, sand. Here a vessel will be in a good position for weighing, and will be protected by the reef to the southward, which, although broken and scattered, is sufficiently compact to break the sea.

Middle ground.—In the northern approach to the Sound the space between Culebrita and the main island is somewhat obstructed by the Middle ground, a shoal on which the depth varies from 2 to 5 fathoms; the shallowest part lies about 2 cables from the nearest part of Culebrita, with the west end of Davy cay and the east end of Bird cay nearly in one, bearing N. by W. $\frac{1}{2}$ W., and a small isolated rocky spot on the north end of the beach, on the west side of Culebrita, nearly in one with the summit of the hill over cape Passage (the north-east point of Culebrita). The north-west 3-fathoms head lies with the west end of Davy cay just covering Shark rock N. $\frac{1}{2}$ E., and 2 cables from the nearest part of Culebrita. The other 3-fathoms head is about a cable to the south-west of it.

Weather channel.—To enter the Sound from the northward between N.E. and Davy cays, there are three passages. The southern of these between Palada cays and Culebrita is the most direct, but far too difficult for a stranger, as no mark can be given. The second or middle passage is between Palada cays on the south side and the Shark and Whale rocks on the north. The western and safest passage is between the latter rocks and N.E. cay. From the latter cay a reef extends to the south-east for a quarter of a mile, and from Davy cay a shallow ledge runs off nearly 2 cables, forming the Weather channel, about $1\frac{1}{2}$ cables in breadth, and the least depth 23 feet.

Directions.—To take the western passage, steer boldly down towards N.E. cay, and, having passed the Whale and Shark rocks at the distance of rather more than a cable, bring the western extreme of Davy cay to touch the extreme of the remarkable bluff at the east end of Culebra. Keep them in one, until the southern sandy beach of N.E. cay comes on with the north end of Scrub cay—a small rocky islet, near the north side of Culebra; then keep away S.W. by W. steering for the Dolphin head—a remarkable hill at the east end of Culebra. When Sandy point of Culebrita opens out clear of Pond point, haul up gradually for the

Bluff, and anchor as most convenient. If going above the Middle ground, keep the Culebra shore aboard.

Tides.—It is necessary to observe that the flood sets in from the north, between N.E. cay and the Palada cays, at the rate of $1\frac{1}{2}$ knots, and the ebb runs out with equal force in the opposite direction.

Lee channel, between N.E. cay and Culebra, is half a mile wide, and has no danger in it until the Middle ground is approached. The wind, however, is generally so unsteady under N.E. cay, that without it is so far to the northward as to enable a vessel to lay up E.S.E., it should not be entered in a sailing vessel except on the flood. The ground is quite clear, and the shore bold, until abreast of Duck point; thence to the Bluff it is fringed with a reef, to the distance of half a cable, distinctly seen from the deck. About a quarter of a mile to the north-eastward of Duck point there is a small coral patch with a depth of 28 feet on it.

Directions.—Entering by the Lee channel, keep midway between N.E. cay and Culebra, until nearly abreast of Duck point, when the island side should be kept aboard, to avoid the Middle ground. The bottom is distinctly seen when in a less depth than 10 fathoms, and the shoal ground may be avoided by the eye.

South channel.—A vessel may leave the Sound either by the Lee or the South channel. The former, however, is the best.

The Tides in the South channel run 2 knots an hour; the flood S.W. by S., and the ebb N.E. by N.

Directions.—Proceeding through the South channel, after passing the Bluff, border well towards Water cay, which is 20 feet high, and pass it at a cable's length to avoid the Porgee heads, which are awash inside the outer reef, and become visible, if the atmosphere is clear, from abreast Mangrove harbour. When nearly abreast of Breeze point, at the entrance of Mosquito bay, the east extreme of Water cay must be brought to touch the hummock on Culebrita, N.E. $\frac{1}{2}$ N., which mark will lead between the Yellow shoal and Reef heads, easily seen if the sun does not shine directly over them. The hummock is a small rocky hill, 93 feet high, on the north-east point of Culebrita, somewhat like a gun quoin, with the thick end to the southward, and is readily distinguished. In this channel the depth will be from 8 to 13 fathoms, and perhaps a cast of $5\frac{1}{2}$ fathoms on a small knoll south-east of Breeze point. When the peak of S.W. cay comes open of Soldier point (the south end of Culebra), N.W. by W., a vessel will be clear of the shoals, and may haul to the wind.

There is seldom a leading wind into the Sound through this channel, but for a steamer it is safe and easy.

Mangrove harbour is a small, but well-sheltered bight, about three-quarters of a mile deep, and somewhat less than a quarter of a mile in breadth, formed by the Bluff on the north, and Water and Battle cays on the south. The entrance is about $1\frac{1}{2}$ cables wide, between two bold reefs, and has a depth of 7 and 8 fathoms, which gradually decreases within to 5 fathoms, over sand and mud; the head of the bight is shallow, but on the eastern side there are 3 and 4 fathoms close to the mangroves.

Directions.—Entering Mangrove harbour, having rounded the Bluff, steer in midway between the reefs, which will be distinctly seen, and anchor according to the vessel's draught. It may not, however, be so easy for a sailing vessel to get out, as the channel trends north-west and south-east, but by warping well up under the weather reef, close to the Bluff, there will be room to cast and lay out. The sea is broken by the outer reefs.

The Basin is a deep hole, 3 cables long and a cable broad, with 4 fathoms water in it, and is entered from the south side of Mangrove harbour by a narrow opening, across which there is a ledge with a depth of 14 feet on it; it is quite sheltered from all winds.

GREAT HARBOUR is one of the most secure basins in the Windward islands, being a perfect natural camber about a mile in length, and in some parts half a mile in breadth, but of irregular shape, and with several small creeks on its shores. The entrance is between two bold reefs, leaving a channel nearly a cable wide, through the centre of which a vessel will carry 5 fathoms water, and within it 5 or 7 fathoms. The great drawback, however, to this otherwise advantageous harbour is the presence of four coral shoals in the fairway to the entrance, almost blocking it up, and for which no good leading marks can be given. To a steamer they are not so formidable, as she has only to steer along the reef between Soldier point and the entrance of the harbour on about a N.N.E. course; giving the reef a berth of $1\frac{1}{2}$ cables, so as to avoid Yellow and Grouper shoals, and having passed them, to steer boldly on through the centre of the channel.

Yellow shoal, with only one fathom water on it, is the southernmost, and its south end lies about E. $\frac{3}{4}$ N. three-quarters of a mile from Soldier point. The Shrimp has two fathoms on it, and lies about S. by W. nearly a quarter of a mile from Breeze point; the Grouper, with $1\frac{1}{2}$ fathoms on it, a quarter of a mile W.S.W. from the Shrimp; and the Snapper, with one fathom on it, midway between Breeze point and the entrance.

Water.—There is a large natural cistern on the south side at the head of Great harbour, in which indifferent rain water may be found.

Directions.—The best route for a sailing vessel bound into Great harbour is to run through the Sound and South channel, and pass between the Grouper and Shrimp shoals, with the wind a-beam, which must be done with the eye alone, from aloft. In fact, the pilotage from the absence of any marks, is far too intricate for a stranger without the assistance of a pilot or good local knowledge. It would also be difficult for a sailing vessel to get out of the channel without warping, and with the wind well to the northward.

The Grampus shoals are a group of small coral heads, rising from a bank of 10 fathoms, and lying about 4 miles from the south-east end of Culebra. The southern head, on which there are 4 fathoms water, is only 10 yards in diameter, and lies with Soldier point just on with the south extreme of S.W. cay, bearing W.N.W. At nearly a mile N.N.E. $\frac{1}{2}$ E. from this is a small cluster of heads with as little as $3\frac{1}{2}$ fathoms on them; these are the most eastern, and lie S. by E. $\frac{3}{4}$ E. 4 miles from cape Passage. The innermost or western knoll, of 3 fathoms water, lies with Soldier point about W. by N. $\frac{1}{4}$ N. distant $3\frac{1}{4}$ miles, and Reef point, Culebrita, N. by E., 3 miles.

Between this western knoll and the reef extending S.S.W. from Culebrita there is a clear navigable channel; but as no safe directions can be given, it will be better for large vessels to pass to the southward of the whole. For this purpose, do not open Signal hill, on St. Thomas, to the northward of Sail rock, and in running to the westward, bring the peak of S.W. cay on with Soldier point N.W. by W.

S.W. anchorage is between Culebra and S.W. cay, and quite secure with the ordinary trade winds. S.W. cay is $1\frac{1}{4}$ miles in length north and south, and its wooded peak rises to the height of 500 feet. The east side of the cay is skirted by a coral ledge to the distance of a cable, and the Culebra shore is also foul for about the same distance.

The north end of S.W. cay is separated from Stream point (Culebra) by a channel $3\frac{1}{2}$ cables wide, having in the centre a coral ledge with $4\frac{1}{2}$ fathoms water on it, and 6 and 7 fathoms on either side, but the tides in it are so strong and the wind so baffling that it is scarcely safe for sailing vessels. At springs the flood runs through to the southward 3 knots an hour, and the ebb with equal strength to the northward.

The anchorage is about $1\frac{1}{2}$ miles in length, and from a half to one mile in breadth, and there is no difficulty whatever in approaching it from the southward. The best sheltered spot will be found in 13 fathoms, with Scorpion point (which runs out low and terminates with a small pinnacle rock) bearing E. by S. distant $3\frac{1}{2}$ cables. If a vessel anchors northward of this, it will be inconvenient in weighing, from the baffling winds and strong tides.

Good anchorage will also be found with Scorpion point bearing N. by E. distant nearly three-quarters of a mile, where all is clear to leeward. Halfway across, between the cay and the same point, there is a small coral patch of 7 fathoms, which should be avoided in anchoring.

There is also good holding ground to the westward of S.W. cay in 13 fathoms, with the West Sister in one with Fungy Bowt, N. by W. $\frac{3}{4}$ W., and the south point of S.W. cay, E. by S. Indeed a vessel cannot be wrong in choosing an anchorage on the lee side of Culebra, as there are no dangers whatever.

Snug bay, on the south-west side of Culebra, is a well-sheltered boat harbour; and in the next cove north of it there is good fishing with the seine, hence called by that name.

N.W. channels.—The passages between the north-west end of Culebra, and the rocks and islets westward of it, are safe and simple to navigate, as all the dangers may be seen from the deck.

Pilot Rock pass, between the north-west point of the island and Pilot rock, is nearly half a mile wide, and carries a depth of 12 fathoms. In taking this channel, avoid the reef extending $1\frac{1}{2}$ cables from the point. Pilot rock is barren, 30 feet high, 100 yards in diameter, bold, and steep-to.

Twain pass is formed by the Pilot rock and the Twins; the latter are two small rocky islets, about 20 feet high, lying close to each other, about three-quarters of a mile westward of the Pilot. At a quarter of a mile south-east from the Twins is a rock awash, named High breaker, and steep-to. The best channel is between it and the Pilot, as there is generally a leading wind through either way.

Fungy bowt channel.—Fungy bowt lies W.N.W. $3\frac{1}{2}$ cables from the Twins, and is a remarkable, barren, round, whitish rock, 145 feet high, with rugged perpendicular sides. The channel between is clear and safe, but be careful of a small head a cable westward of the Twins, and on which the depth is only one fathom.

Washer passage is between Fungy Bowt and the Washer, a small rock only 2 feet out of water, lying N.W. by N. two-thirds of a mile from Fungy Bowt. This channel is clear, with a depth of 14 and 15 fathoms in it. A vessel may also pass to the westward of the Washer, which is steep-to.

After passing to the southward of Fungy Bowt, another chain of small islets will be observed lying to the W.N.W. of S.W. cay.

Sisters.—The three islets nearest S.W. cay are the Sisters, all nearly of the same size, about 45 feet in height, and not more than a quarter of a

mile apart. The eastern one is $3\frac{1}{2}$ cables from the north-west point of S.W. cay, with a clear channel between.

Cross cay lies nearly $1\frac{1}{4}$ miles westward of the Sisters. The cay is narrow, half a mile in length, and its central part projects to the north-east nearly a quarter of a mile, thus forming three legs; it is 135 feet high, and covered with long grass and bushes. About midway in the channel between it and the Sisters is the Black rock, 15 feet high.

Cactus cay, 95 feet high, is the westernmost of this small chain of islets, and lies N.W. by W. about three-quarters of a mile from Cross cay. At its south end there is a remarkable pillar-shaped rock, 75 feet high.

Directions.—The passages between these islets are all free of danger, and the eye will be the guide, keeping in mid-channel; the rocks are bold and steep-to. The best channels, however, for sailing vessels, are those to the westward of the Sisters; for, under the high land of S.W. cay, the wind is so variable, the passages so narrow, and the tides so strong, that they had better be avoided.

Tides.—Through all the above channels the flood sets to the southward at the rate of about a knot an hour for 6 hours, the ebb in like manner to the northward. It is high water full and change, at 9h. 0m. The rise and fall seldom exceeds a foot, and, as before stated, in April and May, the mean level of the sea is generally a foot lower than at other periods of the year. The remarks made on the tides in the passages between St. Thomas and St. John, hold good here.

The flood coming in from the northward sweeps round the Bluff and over the reef to the south-west of Culebrita at the rate of about 2 knots at springs; it there slackens its strength, and meeting the stream setting down on the western side of Culebra, then trends to the southward towards the east end of Bieques or Crab island.

The ebb sets over the Culebrita reef, taking the lee and weather channels out of the Sound, in a reverse direction, and much at the same rate.

On the west side of Culebra, the flood stream, having reached S.W. cay, runs to the S.S.E. towards the east end of Bieques.

BIEQUES OR CRAB ISLAND.*

This island is 18 miles long east and west, and from 2 to 4 miles broad. A ridge of small hills runs nearly its whole length along the middle of the island, and rises to the height of from 600 to 800 feet, mount Pirata at

* See Admiralty chart, No. 130, scale, $m = \cdot 25$ inch.

Vaca point, is at the south-west extremity of the island. The east end of the island bears S. $\frac{3}{4}$ E. about 8 miles from Soldier point, Culebra; and Arenas point, the north-west extreme, bears S.E. $\frac{3}{4}$ S. $5\frac{1}{2}$ miles from the western point of Bahia Honda, the nearest part of Puerto Rico. Between Bieques and Culebra the soundings are regular and the depth from 12 to 16 fathoms. The east end of the island is low, bold, and steep-to, and on the south side the edge of soundings runs along at the distance of about $1\frac{1}{2}$ miles.

Danes bay.—The south side of Bieques for the most part is cut into by little sandy bays, and is free of danger. Danes bay, the first of any consequence, is about 2 miles from the east end. It is a little more than half a mile wide, about the same deep, and carries from 3 to 4 fathoms over sandy bottom. Nearly abreast the bay, about a quarter of a mile from the points, are two small islets, which may be passed on either side.

Sound or Settlement bay, the westernmost of these indentations, is about 5 miles to the eastward of Vaca point; it is about three-quarters of mile deep, and defended by a small fort. In front of it are two small islets called Soldier and Water cays; the latter, which is the outermost, lies nearly a mile westward of the south-east point of the bay, and about half a mile from the shore. On the west side, within a quarter of a mile of it, there is anchorage in 4 or 5 fathoms water.

Arenas bank.—From Vaca point the west side of Bieques trends about N.W. by N. 3 miles to Arenas point. The edge of soundings is here about 4 miles distant, and the shore bold and steep-to, as far as the south end of the sandy beach which forms the north-west extremity of the island. Here a spit of sand runs off N.W. by N. for three miles from Arenas point, upon which are several spots of only 10 feet water; those at its extremity are covered with dark weed, but not being sufficiently discoloured are very dangerous.

To avoid the north end of this spit do not open cape Mala Pascua of Naranjo point, at Puerto Rico, and when El Yunque or Anvil peak is shut in with the hill on the western headland of Bahia Honda N.W. by W., a vessel will be to the eastward of it.

Anchorage.—There is good anchorage under the west side of the island in 5 fathoms water, with Arenas point E.N.E. and the south-west point of the island about S.E. Towards the south-west point the bottom is rocky, and the soundings irregular.

Water.—A small rivulet disembogues at the south end of the beach which forms the north-west extremity of Bieques, but near the shore it is brackish; a small supply of good water, however, may be obtained a short

distance above the outlet. Water may be obtained at port Mula from a large cistern built in the square of the town of Isabella.

Port Mula.—From Arenas point the northern shore of the island trends E. by N. $\frac{1}{2}$ N. 8 miles, when it bends abruptly to the northward for about half a mile, forming a small bay called port Mula. At the mouth of a little stream on the south side of the bay is the principal village of the island, named Isabella II., it contains about 2,500 inhabitants, and is the residence of the governor, who is nominated by the Captain-General of Puerto Rico. At about a mile inland from the village is a hill called Soldier mount. There is anchorage here for coasters in 3 fathoms water, with the point of the bay E.N.E. about 2 cables distant, and in moderate weather large vessels may anchor outside in 5 fathoms with the point S.E., distant about half a mile.

Light.—A fixed bright light is exhibited from a post 10 feet high on point Mula, visible 5 miles, but it cannot be seen eastward of a bearing of S. 53° W.

Mula shoals.—The approach to Mula bay, however, is obstructed by three small dangerous shoals, nearly awash, lying about $1\frac{1}{2}$ miles from the shore.

Caballo Blanco, the easternmost shoal, lies N.W. $\frac{1}{2}$ W. nearly $1\frac{1}{2}$ miles from Mula point, the north extreme of the bay; the Corona lies W.S.W. $1\frac{1}{2}$ miles from the Caballo Blanco, and N.W. by W. $\frac{1}{2}$ W. from Mula point, with from 5 to 7 fathoms water between; and the Mosquito, the westernmost, lies about half a mile W.S.W. of the Corona, and W. $\frac{1}{2}$ N. 3 miles from Mula point. At about half a mile westward of this latter shoal there is a small patch of 16 feet water; and a similar one of the same depth, S. $\frac{1}{2}$ E. from the Caballo Blanco, nearly midway between it and the shore, and W. by N. $\frac{1}{2}$ N. one mile from Mula point.

Caution.—A vessel beating up outside these shoals should not bring Arenas point to the westward of S.W. by W.; or cape Mala Pascua to the westward of S.W. by W. $\frac{3}{4}$ W., until Cabello Colorado, the north extreme of Biequies, bears southward of E. by S. $\frac{1}{2}$ S., which latter bearing leads northward of the Caballo Blanco.

Cabello Colorado point is rocky and steep-to, and bears E. by N. nearly 3 miles from Mula point. Thence to Diavolo point the shore trends about E. $\frac{3}{4}$ S. 4 miles; about midway, close to the land, is Red rock (or la Campana); to the westward of this rock the shore is foul, but to the eastward it is bold and clear.

North, nearly half a mile from Diavolo point, there is a small rocky patch nearly awash, called the Cockroach shoal.

Pelican harbour.—Eastward of Diavolo point the shore is irregular, a mile from it, and about a quarter of a mile from the shore, is Pelican cay, from whence a broken reef runs parallel with the shore for $1\frac{1}{2}$ miles; through it are several small cuts of 12 feet water, leading into snug anchorage for coasters.

SANTA CRUZ OR ST. CROIX ISLAND.

This island* is 19 miles long, in an E.N.E. and W.S.W. direction, but of irregular breadth. The south side is nearly straight, and generally low, particularly towards the west end. Near the centre of the north shore, at the head of a deep bight, is the town of Christianstæd, the capital of the island, and seat of government of the Danish colonies. From the town to the south shore of the island, the distance is about $2\frac{1}{2}$ miles across, and from thence the breadth gradually decreases to the eastward, and terminates in a bluff point, with a sugar-loaf elevation of moderate height just within it.

The western portion from the bight preserves a general breadth of 5 miles, and becomes more elevated on the north side. Mount Eagle, the loftiest summit in the island, $3\frac{1}{2}$ miles east of Hams bluff at the north-west extreme of the island, is 1,164 feet high. Numerous small rivulets empty themselves into the sea, chiefly on the southern shore, but most of them disappear in the dry season, and it is consequently badly watered at that period, and what is obtained is unwholesome until allowed some time to purify. The island is scantily wooded, but highly cultivated, and its roads are excellent. Its area is 49,169 acres, with a population of about 18,500. The principal exports are sugar, rum, and molasses, which employ annually about 14,500 tons of shipping. There is an English vice consul at Christianstæd.

The South Coast of Santa Cruz is bordered by a dangerous broken coral reef, which extends from the east end to nearly abreast Long point, $3\frac{1}{2}$ miles from the south-west point of the island, where it terminates at the S.W. shoal, which has only one fathom water on it, with Long point bearing N.N.W. $\frac{3}{4}$ W. distant nearly $1\frac{1}{4}$ miles. The most dangerous part is from the latter point to Signal hill, 8 miles to the eastward, where it runs along shore more than $1\frac{1}{2}$ miles off. It generally breaks, and as several shallow patches exist outside, it should be cautiously approached. The 10-fathoms line of soundings is from about a half to $1\frac{1}{2}$ miles southward of the outer part of the reef, and the edge of the bank is very abrupt. There are several cuts through the reef, capable of admitting small coasters

* See Admiralty chart:—Santa Cruz island, with views, No. 485, scale, $m = 1 \cdot 2$ inches. The directions for this island are by J. Parsons, Master, R.N., 1854.

into tolerable anchorage within. One of the best is off the entrance of Krausse lagoon. At Great pond bay there is a narrow cut leading into safe anchorage for vessels of 10 feet draught.

Frederichstæd.—The west end of Santa Cruz forms a bay, about 5 miles in extent, and near its centre is the town of Frederichstæd, containing a population of about 3,000. In front of it there is good anchorage in from 6 to 7 fathoms water, with the fort bearing E. by S., and S.W. point S. by W. $\frac{1}{2}$ W. Mooring buoys are laid down for merchant ships, and good landing piers built. The edge of the bank is not more than half a mile from the shore; shallow water extends a quarter of a mile from the north point of the bay, and nearly a mile southward of S.W. point, the south-west extreme of the island. In rounding the latter, a vessel should not haul in until the north point bears N. by E., or come under 10 fathoms water. The edge of the bank lies nearly 3 miles south-west of S.W. point, and terminates abruptly; within it is a narrow coral ledge of 7 to 9 fathoms.

Lights.—Two *fixed* white lights are exhibited from iron posts at the end of the centre pier, visible two miles.

S.W. point projects about $1\frac{1}{4}$ miles in that direction and from it a coral bank extends southward with only 3 fathoms water on it, at the distance of three-quarters of a mile. This shallow water continues off its south-east side and the shore eastward round Long point. The 5-fathoms line of soundings passes at about $1\frac{3}{4}$ miles from the latter, and nearly a mile southward of S.W. point, but on its west side it is only a cable off. Between the two points temporary anchorage will be found in 7 fathoms. water, in case of necessity, and for small vessels farther in at about a mile from the shore in 4 fathoms.

North coast.—The north-west end is considerably elevated, and formed chiefly of bold cliffs, steep-to. Between Hams bluff, which is very remarkable, and Barons bluff $5\frac{1}{2}$ miles eastward of it, the bank of soundings does not extend more than half a mile off, and it is advisable not to approach this part of the coast too near, as a sudden loss of wind might place a vessel in danger.

Salt river and Salt river point.—Between Barons bluff and Salt river point, but nearer the latter, is a narrow cut in the reef, leading to a deep inlet called Salt river, in which, however, there is only shelter for boats. Salt river point is rather low, and forms the north extreme of the island, and is the north-west point of the bight of Christianstæd. Two cables north of the point lies the White horse, a dangerous rock which breaks; and between it and the shore there is a boat channel with a depth of 2 fathoms.

From the above point the shore turns sharply to the south-east for 3 miles, to the harbour of Christianstæd.

CHRISTIANSTÆD HARBOUR.*—This anchorage is sheltered on the north by reefs, which extend along shore in front of the town to a distance of about three-quarters of a mile; but the harbour thus formed is shallow and only capable of receiving a few vessels of about 17 feet draught; and the channels are so intricate, that no safe directions can be given for a stranger, the assistance of a pilot is therefore necessary. A vessel will have to warp out, and buoys are advantageously placed for that purpose. The town occupies a space of about half a square mile, on the slope of a hill of moderate elevation, and contains about 6,000 inhabitants. Good rain water can generally be obtained here, it is stored in a tank on Protestant island, whence it is conveyed in a pipe to a small pier, alongside which boats can fill.

From fort Louisa Augusta, a tongue of sand called the Scotch bank, having in places only 4 feet water on it, stretches to the north-eastward for $1\frac{3}{4}$ miles. Between the western edge of this bank, which runs in a N. by W. direction from the fort and extends off rather more than half a mile, and the east end of the Long reef fronting the town, is the entrance to the harbour. At about $1\frac{1}{2}$ miles eastward of the fort is a small islet with two hillocks on it, named Green cay. The north-east point of the cay bearing S. $\frac{1}{2}$ E. and in line with Sight mill leads in eastward of the Scotch bank; and Barons bluff open of Salt river point W. $\frac{1}{4}$ S. leads north of it.

Light.—The entrance to the harbour is protected by fort Louisa Augusta, from the flagstaff of which there is exhibited a harbour fixed light, visible 4 miles; there is also a white light visible 2 miles shown in front of the Custom house from an iron framework 8 feet high.

Pilots.—The pilot station is on Protestant cay, which lies close off the town, and pilots are at all times quickly in attendance off the entrance, on seeing the usual signal.

Buck island, 340 feet high, lies N.E. by E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles from fort Louisa Augusta, and W.N.W. $3\frac{1}{2}$ miles from the east end of Santa Cruz. It is a mile in length, east and west, nearly half a mile in breadth, and rises on the southern edge of a dangerous coral bank, which extends westward about three-quarters of a mile and sweeps round a mile north of the island. There are also several shallow patches as far eastward as $1\frac{1}{4}$ miles. The island lies directly in the route to the harbour, and should be carefully approached. For this purpose, Hams bluff must be

* See plan :—Christianstæd harbour on Admiralty chart, No. 485, scale, $m = 5$ inches.

kept well open of Barons bluff, W. by S. $\frac{1}{2}$ S.; these bluffs in one will lead 2 cables outside the reef, in 4 fathoms water. The channel between the west end of the reef and the north-east end of Scotch bank is 2 miles wide.

Anchorage.—There is good anchorage, in 4 fathoms, to the south-west of Buck island, and it is generally chosen by vessels of war. The usual way of approaching it is from the northward, round the west end of the reef. The latter may be passed by the eye, or by bringing the dwelling house of Green cay estate (on a mound near the shore) in line with Sight mill bearing S. by W. $\frac{1}{4}$ W. The mill stands on the centre ridge of hills—which is here lower than elsewhere—and has neither head nor vanes. In running in upon this mark, however, the vessel will cross over 27 or 28 feet water, and then deepen to 7 fathoms south-west of the island. Soon after passing within the edge of the bank, she may haul up, and anchor when the east point of Buck island comes open of the sandy point on its south side.

Buck island channel.—From Green cay the shore of Santa Cruz is skirted by a reef all the way to the east end. Within it there is snug anchorage for small craft, which find their way through a small cut north of Coakley bay, and warp up. With good local knowledge a vessel may enter Buck island channel from the south-east by running in between the island and the reef skirting Santa Cruz; keeping the north extreme of Green cay in line with mount Eagle W. $\frac{1}{2}$ S. The latter from this direction will show as the left of two hills, apparently very nearly of the same height; the northern one is Salt river mount, rising near the shore 2 miles farther eastward. The least water will be $6\frac{1}{2}$ fathoms, the depth generally being 10; care must be taken to keep the leading mark on until the vessel is abreast of Buck island, when she may haul to the northward.

East End bank.—An extensive bank of soundings, from about 3 to 5 miles broad, stretches off N.E. by E. 9 miles from Santa Cruz, curving round Buck island reef on the north and west, and passing about one-third of a mile north of the Scotch bank at about $1\frac{1}{4}$ miles from the shore. On its extreme edge there is one of those remarkable wall-sided narrow coral ledges, which commencing about 3 miles E. by N. of Buck island reef, sweeps round in a convex form outwards at the extreme east end, and terminates S.S.W. 2 miles from the east end of the island; the northern part is from half a mile to one mile broad, and has a depth of from 6 to 10 fathoms on it; the southern portion is from a little more than half a cable to 3 cables broad, and has from 8 to 10 fathoms on it, and in the space between there are from 12 to 17 fathoms.

The shoalest part of the northern ledge bears N.E. $\frac{1}{2}$ E. 7 miles from the east end of Santa Cruz, and in heavy weather it breaks and becomes dangerous ; it is therefore advisable, under such circumstances, if coming from the southward, not to approach the east end within 12 miles, nor to bear up before Buck island bears W.S.W. Coakly bay mill in line with Lang's observatory leads on the north-east part of the ledge, but towards the western extremity it runs a little to the northward of this mark. The dwelling house, which is 300 feet to the southward of the observatory, in one with Signal hill flagstaff, leads over the southern part of the ledge. The south side of Buck island in line with Belle vue mill leads just outside the northern edge.

Observatory.—Major Lang's observatory stands on a hill, 440 feet high, about a mile E.S.E. of the city, and from numerous astronomical observations made by that officer, its position is assumed to be in lat. $17^{\circ} 44' 32''$ N., long. $64^{\circ} 41' 0''$ W.

Directions.—Vessels bound to Christianstæd generally approach it from the north or north-east quarters. In this case, having passed Buck island—observing the precautions already pointed out to avoid the reef—haul in towards Green cay. In standing towards the Scotch bank take care to keep Barons bluff open of Salt river point. Having neared it, fort Louisa Augusta will be seen at the north-east end of the town, when it should be brought in line with the first hill to the eastward of a large notch or saddle formed by two hills. Steer in on this line, S. by E. $\frac{1}{2}$ E., very carefully, and it will lead to the entrance of the channel, and outer buoys, which lie about 2 cables within it.

On arriving between the second *red* buoy on the left, and a *black* buoy on the right hand, alter course to the westward, round the north side of a dry sand-bank which will be seen ahead, passing between the two southernmost of three *black* buoys ; thence haul up round the north-west end of the middle shoal, leaving the *black* buoys on the port hand, and shape a course into the deep lane of water in the direction of the fort in the town, taking up an anchorage as most convenient ; observing that the vessel must moor. Vessels of war generally lie about $1\frac{1}{2}$ cables N.E. of the north-east point of Protestant cay ; merchant vessels go farther up the lane. Those drawing only 10 feet may lie alongside the jetty of the town.

Eastern channel.—There is a channel over the inner part of the Scotch bank, with a depth of 18 feet in the centre, which may be used by vessels of light draught.

Having passed Green cay and entered by the southernmost *red* buoy, when westward of it, steer directly between Louisa Augusta point and the

dry sand-bank westward of it. Continue on until the north extreme of Protestant cay comes in line with the south-east end of Richmond house; then steer with this mark on, and pass northward of a small *black* buoy on the extremity of a bank stretching off from the east side, and haul in for the anchorage. Richmond house is a large building with a *red* roof, standing in grounds of a park-like appearance on the sloping land near the sea.

Although easy of access at almost all periods, it is difficult to get out of the harbour, and in the months of January and February, when the wind hangs to the northward of East, a vessel may meet with considerable detention. With the usual trade wind she must warp up to the entrance; towards daylight it is generally calm, when a vessel may be able to tow out, assisted sometimes by a light land air from the south-east, which will enable her to obtain an offing clear of the shoals before meeting the regular breeze.

Caution.—It will be evident that these directions are far too difficult for the guidance of a stranger, and they are consequently only intended to assist him with the plan, in a case of absolute emergency.

Winds.—There is no regular land breeze at Santa Cruz; but when the trade is light during the day it generally falls calm in the night. Northers, with the accompanying heavy ground swell, do not appear to reach this island.

Tides.—No perceptible tidal stream has been observed at Santa Cruz, but a rise and fall takes place of from 4 to 8 inches, according to the strength of the wind, which will sometimes raise it to 18 inches. It is high water, full and change, at 7h. 30 min. Between this island and St. Thomas there is usually a slight westerly current.

CHAPTER V.

THE GREATER ANTILLES—PUERTO RICO AND THE MONA
PASSAGE.

VARIATION IN 1887.

Puerto Rico, east end, $0^{\circ} 30' W.$ | Mona island, $0^{\circ} 20' E.$

PUERTO RICO.

THIS island, the smallest of the greater Antilles, was discovered by Columbus, in 1493. The Spaniards from San Domingo took possession of it in 1509, and it has remained in their hands from that period. It is about 93 miles in length, east and west, its greatest breadth 33 miles, with slightly indented shores. A lofty broken range of mountains rises at the north-east end of the island, and runs through the centre as far as the neighbourhood of port Arecibo on the north coast, where it terminates in a remarkable hill, called the Silla de Caballo (Horse saddle). The most elevated summits are towards the east end, and 11 miles W.S.W. from San Juan head, the north-east point of the island, el Yunque or Anvil peak rises to the height of about 3,700 feet, and is generally a very conspicuous and useful object.

LIGHT.—On cape San Juan is a cylindrical dark grey and white lighthouse 265 feet above high water, from which is exhibited a white light with a red flash every three minutes, and is visible 18 miles.

The principal exports are sugar, coffee, tobacco, cotton, molasses, hides, rum, and cattle. The population was in 1878—total 729,445. In 1882 the total value of the exports amounted to 2,316,476*l.*, and the total value of the imports was 2,963,096*l.* The disturbed state of the island has interfered greatly with the railways and other works in progress.

The shores of this island* are but imperfectly known, and San Juan, on the north side, is the only secure port for large vessels during the hurricane season.

* See Admiralty charts, general charts Nos. 761, 762, and 130, which are outline charts only.

EAST COAST of PUERTO RICO.—Nine small rivers disembogue on the eastern side of Puerto Rico, and there are several ports which are visited by small vessels for the sugar which is largely cultivated at this end of the island. The information, however, with regard to this island is so scanty and imperfect, that the directions, except for those parts that have been surveyed, must be received with caution.

Port Fajardo,* the first to the southward of San Juan head, and $3\frac{1}{2}$ miles from it, is between Cuaba and Barrancas points, and carries a depth of from 16 to 23 feet; it is, however, scarcely more than a narrow canal sheltered from the east by the small islets Obispo, Zancudo, and Ramos and also a reef between the two latter, on which there are from 6 to 12 feet water, and on which in some parts the sea breaks. In the reef there are two navigable cuts, through which a vessel may carry 23 feet, but they should only be taken in a case of necessity; the southern one is the larger.

There are two entrances into port Fajardo. The southern one, with a depth of 18 feet in it, is quite clear, and lies between Barrancas point, and Ramos islets; and with the wind to the northward, it is the best to take, in leaving the port. The northern entrance is between Cuaba point and Obispo islet, and has from 23 to 36 feet water in it, but it is obstructed nearly in the centre by a coral patch, on which there are only 6 feet, which requires great care to avoid; still, although narrow, it is the best by which to enter.

Approaching the port from the eastward, between Culebra and Bieques, a vessel may take either the channel between the Cordillera and the Palominos islet; that between the latter and the Largo bank; or the one between the Largo bank and the chain of islets and reefs called Piraguas and the Lavanderas. The first channel appears to be the best, although the narrowest, for all the dangers are seen; the depth varies from 8 to 12 fathoms, and with the wind from the north-east it leads to windward of the port. In the second there are from 7 to 11 fathoms, and in the third 6 to 8 fathoms.

The Cordillera appears to be the name given to a chain of small islets and reefs which extend from about three-quarters of a mile off San Juan head, in an E.S.E. direction for about 11 miles. The eastern cluster of these islets are called the Barriles; they are steep-to, and the channel between them and the Washer and Cactus cays off the west end of Culebra, takes their name, is about 2 miles wide, and 10 fathoms deep. When the wind is from the south-east, vessels may pass east of Puerto Rico and to

* See Admiralty chart, No. 130; scale, $m = \cdot 25$ inch.

the northward through this channel; and vessels may also take it from the northward with north-east winds.

A second channel, having the same depth as the former, is formed between the Barriles and the Hermanos at about 2 miles westward, from which it takes its name. The San Juan channel, between the Cabeza or head of the same name and the western extremity of the Cordillera is about three-quarters of a mile in breadth, and 9 or 10 fathoms deep. This is, in general, the best channel for vessels from the east coast of Puerto Rico with the wind from the north-east. The western extremity of the Cordillera, which forms the north boundary of the channel, is composed of two groups of rocks a little elevated; the easternmost of the two is named Icacos, and the western group Cucaracha; the latter is nearly on the meridian of San Juan head.

The Palominos, lying 3 miles S.E. from San Juan head, is a small, narrow, wooded islet, nearly a mile long north and south, and of moderate elevation. It is skirted by a reef on the north and west sides to the distance of half a mile, and anchorage will be found about a mile from its western shore in 6 or 7 fathoms water.

Largo bank, which forms the south side of the second or middle channel to port Fajardo, is nearly on the parallel of Ramos islet, and about $1\frac{1}{2}$ miles eastward of it, with a clear channel between of 7 fathoms water. The bank is $1\frac{1}{2}$ miles in length, north and south, but narrow and steep-to. In places there are 13 feet water on it, and the sea over it generally breaks.

Great and Little Piñero are two small, low, wooded islets, lying between Medio-mundo and Piñero points; the latter is the eastern extreme of Puerto Rico, which is also low and wooded. The larger islet is skirted by a reef on the west side, which towards the north end becomes connected to Medio-mundo point by a bar on which there are not more than 13 feet water, and the channel is only fit for boats. Between this reef and one which skirts the shore between the above points, a narrow bight is formed, at the head of which small vessels will find anchorage in $3\frac{3}{4}$ fathoms water, sheltered by the islets, to the eastward, but open to the south and south-east. Little Piñero is nearly connected to Great Piñero by a ledge on which there are 13 feet water.

The Descubridor is a small head between the Chinchoros and Little Piñero, lying about $1\frac{1}{4}$ miles southward of the western Lavandera. This danger is marked in the Spanish chart of 1842, but it does not appear in the Danish chart of 1849, and its existence seems doubtful.

The Lavanderas are two small rocky shallow banks on which the sea breaks. They lie in a N.E. by E. $\frac{1}{4}$ E. direction, one about a mile,

the other nearly $2\frac{1}{4}$ miles, on nearly the same bearing from the north point of Little Piñero; they are steep-to, and 5 fathoms water will be found close along side them.

The Piraguas, eastward of the Lavanderas, are two small rocky islets, of moderate elevation, about $1\frac{1}{2}$ miles apart, and may be seen at some distance. The easternmost islet lies E. by N. $\frac{3}{4}$ N. about 4 miles from Little Piñero. They are steep-to, with a clear channel between them of not less than 5 fathoms water. The Lavanderas and the Piraguas lie on the south side of the south channel to port Fajardo.

Directions for the north channel, or that between Palominos islet and the Cordillera chain. A vessel bound to port Fajardo, and having passed to the southward of Culebra, should bring the south point of S.W. cay and Soldier point (the south end of Culebra) in line; and having run to the westward of Palominos upon this mark, should bring the north end of that islet on with either of the above points, and continue on this course until the depth is 6 fathoms, about one quarter of a mile from Guava point, which is about $1\frac{1}{4}$ miles south of San Juan head. Thence haul to the southward, skirting the shore at about the same distance, and when Obispo islet bears East, anchor in from 16 to 20 feet water.

This route will lead to the northward, and afterwards to the westward of the 6-foot coral patch in the middle of the channel before mentioned, in page 193; if wishing to pass to the southward of it, having rounded Palominos, steer so as to pass near Obispo, keeping the peak el Yunque bearing nearly W. by S. $\frac{1}{4}$ S., or the north point of Palominos E. by N.

The Chinchoros are two dangerous banks on which the sea generally breaks, and lie, one a mile, and the other $2\frac{1}{2}$ miles, S. $\frac{1}{2}$ W. from the eastern Piraguas. On the northern bank, which is of small extent, there are 13 feet water, with 5 fathoms around it. The southern one, which is three-quarters of a mile north-east and south-west, and nearly half a mile across, has only five feet water on it, and is equally steep-to. A vessel may go between them, or between the northern one and the Piraguas, but it will be better to pass to the southward of both. West mountain, St. Thomas, in one with Soldier point, Culebra, bearing E. by N. $\frac{1}{4}$ N., will lead about a quarter of a mile from the south end of the southern bank; it will therefore be prudent to keep Soldier point a little northward of the mount, or to bring it to bear E. by N. $\frac{3}{4}$ N., which will lead clear of all dangers between Bieques island and the south-east end of Puerto Rico.

Bahia Honda.—This bay, a little westward of the south point of Puelca island, is about a mile in extent, and open to the southward;

it is protected by reefs which contract the channel from a mile to about a quarter of a mile in breadth. The eastern side of the bay terminates to the southward in a low sharp point, named Puelca; the west side in a bold headland, crowned by a little hill: near the latter a dry rock will be seen on the reef, and off the former the Cabras, two small flat islets, covered with brushwood. The reef, which bars the entrance, skirts also the interior of the bay, and some of the patches within have only 13 feet water on them, but these and the reef are easily seen. The river Aguas Claras disembogues at the north-east corner of the bay.

Directions.—To enter Bahia Honda, having brought Puelca point to bear about N. by W., steer towards it, and the eye from aloft will be the best guide to lead a vessel up to, and through the reef, and she may anchor in from 5 to 8 fathoms water between the patches. The anchorage, however, is so confined that large vessels had better lie outside the reef, off the entrance, in 6 or 8 fathoms.

Algodon bay.—From the west point of Bahia Honda to Lima* point, 4 miles to the south-west, the coast recedes into a deep bight, in the middle of which, near the shore, is a little islet, named Algodon, of moderate elevation. The depth of water in the bay varies from 16 to 13 feet, the latter near the shore, and it is sheltered from S.W. round by north to N.E. Three small rivulets run into it. The Algodon bank, nearly half a mile in extent, with 2 fathoms water on it, lies with its eastern part on the meridian of the west part of Algodon point, which is a large round headland, and from the southward presents a face nearly half a mile in extent. The south part of the bank is about half a mile from the point; the channel between is 2 cables in breadth, with $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water. In steering through, haul round Algodon point, and anchor in 16 feet water.

The Piedras bank has 2 fathoms water on it, with 3 fathoms close to; there is a narrow channel between it and that of the Algodon. The position of this bank is doubtful, but it is supposed to lie with Algodon islet bearing between N.W. $\frac{1}{2}$ W. and W. by N. $\frac{3}{4}$ N., distant half a mile.

Lima bank, which generally breaks, is a flat rocky ledge about 3 cables east and west, with only 3 feet water on it, and 3 or 4 fathoms near it, lies E. by S. southerly, three-quarters of a mile from Lima point, and S. $\frac{3}{4}$ W. nearly $1\frac{1}{4}$ miles from Algodon islet. At the distance of about $1\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. from Algodon islet, a rock is marked in some charts, position doubtful. The *Manuel de la Navigation dans la Mer des Antilles*, 1875, gives the depth of water in the bay rather greater than we have stated it to be, but Algodon bay and port Naguabo should be approached cautiously.

* See Admiralty chart, No. 762. General chart only.

Port Naguabo is formed by Lima point on the north-east and Santiago islet about $2\frac{1}{2}$ miles to the south-west. The depth of water is from $4\frac{1}{2}$ to $3\frac{1}{2}$ fathoms, shoaling quickly to 3, and near the shore there are 2 fathoms; the bank off Sandy point is said to be shifting. At the mouth of the river Naguabo, on the right bank, and $1\frac{1}{2}$ miles westward of Lima point, is the village of Ucaris, off which small vessels find anchorage with the winds from East round by north to S.W. Large quantities of cattle are exported from here to the lesser Antilles.

Port Humacao is between Santiago islet on the north-east and Candeleros point to the southward, which is known by a little hill on it. The latter point is bordered by a reef which extends off a short distance; at nearly 2 miles northward of it is the mouth of the river Humacao, and about one mile farther on in the same direction, at a short distance from the shore, are the Morillos, two rocky islets. Santiago islet, 2 miles to the north-east of the Morillos, is of moderate height, and from its south-east side a reef extends out in that direction more than a mile, and in some parts is nearly dry. The islet is a good mark by which these two ports may be known. If from the eastward, bound to either or to those which follow, it will be better to pass southward of Bieques island. The towns of Naguabo and Humacao are a short distance inland on the borders of the rivers of the same name.

In 1863, 56 British vessels (6 only of which had cargoes), amounting to 6,780 tons, entered inwards at the ports of Naguabo, the value of the cargoes being 23,266*l.*; and 56 vessels of the same tonnage cleared outwards, with cargoes valued at 116,191*l.*

Port Yabucoa.—Icacos point is nearly 2 miles southward of that of Candeleros, and may be known by a small rocky islet near it. Port Yabucoa is between Guaynes point, which is a little southward of that of Icacos, and Yeguas point farther on. The river Guaynes here runs into the sea. The village of Yabucoa stands about 2 miles in the interior, nearly abreast the west end of Bieques island.

Port Maunabo is formed by cape Mala Pascua, the south-east end of Puerto Rico, on the south, and Tuna point on the north. The town is situated some miles in the interior, on the borders of the river which empties itself into the port.

Port Patillas is 6 miles westward of cape Mala Pascua, in the bight between Viento and Figura points, which latter separates it from Arrayo and Guayama to the westward.

Guayama reef.—This reef extends 13 miles in an E.N.E. and W.S.W. direction, and is divided into three parts: the eastern being named Ola Grande, the middle Algarrobo and the western Media Luna. It trends in the direction of the coast at a distance of $3\frac{1}{2}$ miles from it; the

western part is on the meridian of Guayama, and it terminates to the eastward, with cape Mala Pascua bearing N.E. by N. easterly.

Directions.—There is seldom much sea on the eastern coast of Puerto Rico, which renders the anchorages there very convenient. In leaving them much time will be saved by passing out through the channels described in page 193, instead of running to leeward round the west end of the island. Being off the south-east coast of Puerto Rico and near the entrance to the channel formed by it and Arenas banks, when standing towards the Lima bank, the west point of Bahia Honda should not be brought eastward of N.N.E. $\frac{1}{2}$ E. When approaching the north end of the Arenas reef, in standing to the southward do not open out cape Mala Pascua of Naranjo point. When el Yunque is shut in with the hill on the west point of Bahia Honda a vessel will be to the eastward of the Arenas reef, and the southern boards may be prolonged.

Do not, however, bring cape Mala Pascua to the westward of S.W. by W. $\frac{3}{4}$ W., which will avoid the Mosquito, Corona, and Caballo Blanco banks (page 185), which lie off the north shore of Bieques, in the neighbourhood of port Mula, and on which the sea does not always break. In standing to the northward, go no farther than to bring West mountain, St. Thomas, in one with Soldier point, Culebra, E. by N. $\frac{1}{4}$ N. until to windward of the south Chinchoros bank, which lies with the south point of Palominos, in one with the westernmost Piraguas. When the latter is in one with Zancudo islet N.W. $\frac{1}{2}$ W., a vessel will be to the eastward of the Chinchoros, and eastward of the narrowest and most dangerous part of this channel, and may then work to windward without fear.

When sufficiently far to the eastward, a vessel may pass out through the channel between the Barriles and Hermanos islets, which is 2 miles wide, and N.N.E. $4\frac{1}{2}$ miles from the easternmost Piraguas; or between Icacos, Cucaracha, (the westernmost of the Cordillera,) and San Juan head, according as the wind may be to the northward or southward of East. The last channel being the westernmost, she may proceed through it as soon as she has rounded the eastern Piraguas, which, however, must be given a wide berth. *See* page 194.

With the wind from the north-east a vessel may beat through in a day and a half, and from the south-east, may run through in half a day.

With a pilot it may be accomplished in much less time, as follows:—

Having cleared the north extreme of Arenas bank steer to the northward, so as to pass between the western Lavandera and the Little Piñero, or between the Lavanderas, on which the sea always breaks. Steer east or west of the Largo bank, and thence west of Palominos and through the channel by San Juan head; but to do this the wind should be to the southward of East. In passing between the Little

Piñero and the western Lavandera, bring the outer extremity of San Juan head on a N. by W. $\frac{1}{2}$ W. bearing, which course will lead to the westward of Largo bank, and close up to the head. In taking this route the position assigned to the doubtful Descubridor bank, said to be South $1\frac{1}{4}$ miles from the western Lavandera, and about the same distance from Little Piñero, should be carefully avoided.

These directions, however imperfect, will serve to point out the most prominent dangers, and at the same time warn strangers not to get entangled among them without the assistance of a pilot.

Tides.—The tides, on the eastern coast of Puerto Rico, run with great strength to the north-east seven hours, and to the south-east five hours.

THE NORTH COAST of PUERTO RICO is rugged and uneven; it runs in nearly a straight line east and west, and between San Juan head and port San Juan presents no shelter whatever. The mountain range of Luquillo runs from the east end of the island, nearly parallel to the coast for a distance of about 14 miles, then turns abruptly to the southward for several miles and resumes its westerly direction; the peak of el Yunque, at the eastern part of the range, is very conspicuous as far westward as port San Juan. San Juan head slopes gradually from the summit of the hills to the sea and terminates in a low but clearly defined point; for about 14 miles westward from the head, the coast is composed of dark rugged-looking cliffs, breaking down from the mountain side, but as the hills turn inward the land becomes low and undulating, and appears to be well cultivated, many chimneys of steam sugar-mills being seen above the trees. From off the west end of this high and cliffy portion of the coast, the fortifications and part of the city of San Juan will be seen. The shore appears to be skirted by a reef, enclosing numerous small cays and islets over which the sea breaks violently, and it should not be approached within the distance of 3 miles.*

PORT SAN JUAN† lies about 30 miles westward of San Juan head, and is formed on the north side by the Morro island, nearly $2\frac{1}{2}$ miles long east and west, and about half a mile broad, which is separated at its south-east end from the main land by a narrow boat channel, and connected to it by a bridge at the east end. The city, which is the capital of the island and strongly fortified, stands on the steep slope of the south-west side of the Morro, and is partly hid from the sea by the rocky ridge which forms the northern shore. The population in 1867 was about 20,000.

* A small rock, with 14 feet over it, and 5 and 6 fathoms around, is said to exist about 20 miles eastward of port San Juan, and 3 miles off shore.

† See Admiralty plan :—Port San Juan, No. 478; scale, $m = 6.7$ inches.

In 1873 the total value of all the imports was 2,631,618*l.*, and of exports 1,682,986*l.*

Coals may be obtained, but they are expensive and must be brought off in boats.

Towards the east and south the harbour is sheltered by the low swampy land of Puerto Rico, and on the west by the Cabras islands, and the shallow banks which connect them to the shore. The Cabras consist of four small islets and two small detached rocks close off their east end, the nearest of which lies 4 cables westward of the Morro point; foul ground extends for nearly 2 cables off them. On Cabras island (the largest) are two large hospital dwellings, and on the southernmost islet, called Canuelo,—which is the nearest to Puerto Rico, and nearly a quarter of a mile from the largest islet,—there is a fort which commands the entrance. Between the Morro and the Cabras the channel into the port is barred, and with strong northerly winds it breaks and becomes dangerous, although it carries a depth of from $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms.

The west side of the Morro island is foul to the distance of about a cable. The *red* barrel-buoy (which it is intended to replace by a boat buoy) on the outer extreme edge of this ledge,—called the St. Helena shoal,—lies in 17 feet water, with the western extremity of the ditch of the Morro in one with the only watch-tower in sight on the south side of the Morro. The channel is here little more than $1\frac{1}{2}$ cables wide, its western edge being unmarked except by a wreck (of a steamer). Within this edge the western bank sweeps round, forming a deep bight, terminating in a sharp point at the Tablazo shoal, on which is a conical *red* buoy, and further in on the same side of the channel there is a *red* buoy.

Vessels intending to make a short stay will find this the most convenient anchorage, and the best berth will be found nearly abreast San Juan gate, in 5 fathoms water, between the Tablazo and St. Augustin shoals. The latter is a salient point of the Morro ledge lying nearly west of San Juan gate, and a little more than a cable from the nearest part of the shore, its edge to the Puntilla shoal being marked by 3 large *red* warping buoys.*

The Puntilla shoal extends about $1\frac{1}{2}$ cables southward of the sandy point of that name; the channel here is about $1\frac{1}{4}$ cables across, with $3\frac{1}{2}$ to 6 fathoms water, its weather side being the deepest. In 1883 the navigating officer of H.M.S. *Garnet* states, that the harbour is fast filling in, and that in consequence thereof the royal mail steamers drawing over 20 feet will be unable to enter the harbour in the course of a few years.

To the eastward of these sand-spits is the inner port, with a depth of from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, and quite secure against all winds, but the water is very foul, owing to the number of sewers emptying into it. The Yufri

* The positions and description of these buoys cannot always be depended on.

shoal is marked by one, and the western edge of the Punta Larga by two *red* conical buoys; there is also one on the northern edge of the Anegado shoal, south-eastward of the Yufri. Southward of the Yufri shoal are two mooring buoys for the English and French mail steamers, and in the inner harbour, eastward of the arsenal, is another mooring buoy for Spanish ships of war.

LIGHT.—The lighthouse in the upper battery of Morro fort exhibits a *fixed* light having a brilliant *flash* for *five seconds* every *minute*. The light is elevated 171 feet above the sea, and is visible 18 miles.

A Semaphore is erected in the Morro fort, with which vessels may communicate by using the International code of signals. A black ball is hoisted on the gaff of the signal mast to indicate the probable approach of a storm.

Directions.—Port San Juan.—Vessels entering this port are recommended to take a pilot, as dependence cannot always be placed on the buoys marking the shoals being in position; and as vessels are seldom boarded by a pilot till within the harbour entrance, caution should be specially observed regarding the buoy intended to mark the south-west extreme of St. Helena shoal, east side of entrance to the port; this buoy has at times drifted, and vessels run into danger.

Port San Juan may be readily distinguished by the Morro castle and lighthouse at the east side of its entrance. Approaching from the eastward, run down the north side of the island at the distance of not less than 3 miles, until Salinas point comes a little open to the northward of great Cabras island; keep on this line until the mouth of the harbour comes open, when steer for it, giving the Morro point a berth of a good cable, and having rounded the buoy on St. Helena shoal, haul up for the anchorage abreast San Juan gate; with the wind well to the northward this may be gained, but should it be southerly, having passed the Morro, shoot as far in as possible and anchor, towing or warping up when the wind falls. With the wind strong from the northward the sea on the bar frequently breaks and becomes dangerous; on account of the difficulty of steerage, great caution must be used. In a sailing vessel, a pilot will be necessary for the inner port, where the holding ground is excellent, and the land eastward of the town being low, the benefit of the cool trade wind is felt, but, as before stated, the water is foul. No good leading mark can be given for the narrow channel between the outer anchorage and the Puntilla shoal, and as the water is muddy, it cannot be distinguished by eye.

Inner harbour.—The channel to the inner harbour is marked by *three red* barrel-buoys on the port hand and *two* small conical *light red* buoys on the starboard hand. From the outer harbour the passage to the

inner harbour will look puzzling to a stranger, as more than this number of buoys will be visible.

To enter the inner harbour steer to pass the *red* barrel-buoy off San Juan gate at 100 yards distance, and then between the *red* barrel-buoy off the Barrio de la Puntilla and the two conical *light red* buoys on Tablazo shoal, keeping well over to the port hand. When abreast the *inner* conical buoy, the barrel-buoy off the end of Puntilla shoal will not fail to be recognized, and it must be passed close-to on the port hand, and two small *red* conical buoys, on Punta Largo shoal, off the city, brought immediately on the starboard bow, to avoid going on that shoal. Moor with open hawse to the north-west in the outer, and to the north-east in the inner port.

Tides.—It is high water, full and change, in port St. Juan at 8h. 2m.; springs rise about $1\frac{1}{2}$ feet.

The north coast of Puerto Rico from San Juan to Arecibo, a distance of 33 miles, affords only indifferent anchorages, of which Manati is the best.

Manati river.—Coasters and other vessels which ship the produce of this coast, anchor either at the mouth of the river, where there is no shelter and where landing is impracticable in bad weather, or at Palmas Altas, which is more secure with ordinary winds. In fair weather the coast may be approached within a mile, in depths varying from 15 to 26 fathoms.

Tortuguero is a small town on the shore, about 20 miles westward of port San Juan. This part of the coast as far as Arecibo should not be approached within 3 miles.

Arecibo river, having its outlet east of the town of that name, has 3 feet water on its bar. When much flooded the river forms another channel to the westward; but this entrance is always dangerous on account of the reefs which skirt that part of the coast. The river rises in the mountain chain which traverses the island in an east and west direction; and between Utuado, a town near its source, and Arecibo, a considerable trade in provisions is carried on by means of rafts.

Arecibo is a port open to foreign commerce; the coast in the neighbourhood of the port is fertile. The annual exports are, sugar 15,000 barrels, tobacco 1,000 tons; coffee and cotton are also exported. Upwards of a hundred sailing vessels and as many coasters frequent this port yearly.

Between Arecibo and Aguadilla the coast affords no shelter even for coasting vessels.

Arecibo is a small reef harbour of considerable commercial importance, about 12 miles westward of Tortuguero, but in the winter season it is only safe for small vessels that can get inside the reef. At that period vessels of large draught will find anchorage on the bank, about 2 miles off shore,

but they will ride heavily and must be prepared to slip the moment the wind threatens to veer to the northward or westward. In the months of April, May, June, and July vessels of moderate draught may venture farther in, and anchor under the reef in from about $3\frac{1}{2}$ to 4 fathoms water.

The town stands on the western side of the bay, and is protected by a circular fort to the eastward of it: and about a mile to windward of the town a tower and signal post will be seen on a steep hill; an old fort on the beach to the southward has been removed. Near the centre of the reef is the cut or channel for small vessels, and at the east end, between it and the cliff, there is a passage for boats.

Water.—There is a rivulet of excellent water, deep enough to admit launches, at the north-east end of the bay, near the town of Arecibo.

NORTH-WEST COAST of PUERTO RICO.—From Arecibo to point Peña Agujereada (pierced rock), 24 miles to the westward of it, the northern coast of the island is flat, low, and sandy. It there takes a south-west direction for a mile, and is formed of bold, rocky cliffs, which terminate at Bruquen point, the north-west end of the island. From this point the coast curves outward to the south-west for about a mile, and again becomes low and sandy, as far as point Peñas blancas (Whitestone point), which is covered with trees. Bruquen point may be rounded within a mile, where the depth will be from 20 to 25 fathoms; but the coast here is fringed with reef, and must be cautiously approached.

Aguadilla bay,* between Peñas blancas and San Francisco points, is clear of danger, except the sand bars which extend 2 cables off the mouths of the rivulets on its southern side; the whole shore is sandy and skirted by a narrow ledge of soundings about a quarter of a mile in breadth, and very steep. The town of San Carlos, about 2 miles southward of point Peñas blancas, stands on the shore, and the river Aguadilla, a stream of excellent water, runs through the centre of it. Casualties are said to be rare on this part of the coast; Aguadilla bay is the safest anchorage in the island.

The exports during a year amount to 2,500 tons of coffee, 6,000 barrels of sugar, besides cotton and tobacco. Upwards of 180 steam vessels enter and leave the port annually.

Supplies.—Aguadilla bay is frequently visited, as it is an excellent place for water and all kinds of refreshments.

Anchorage may be taken up anywhere off the town in from 10 to 18 fathoms. The most convenient berth for large vessels will be found

* See Admiralty plan:—Aguadilla bay, No. 479; scale, $m = 0.5$ inch.

with the church E. $\frac{1}{2}$ S., and the north point of the bay N. by W., in 18 fathoms, over good holding ground, half a mile from the shore.

Directions.—The only danger to be avoided, approaching from the northward, is the ledge off Bruquen and Peñas blancas points. Coming from the southward Jigüero point may be rounded at the distance of a mile, but care must be taken to keep that point—which is the west extreme of Puerto Rico—to the eastward of N. by E., to avoid the foul ground which extends from it as far as the south-west end of the island.

In taking up an outer berth be sure the vessel is in soundings, and not to bring up too short, to avoid dragging off the bank, which is very steep-to. In the winter season, when strong north-west and north winds occur, it will be advisable to quit the anchorage the moment a change threatens. At this period, even with strong north-east winds, a heavy uneasy swell rolls into the bay, and sends a high surf on the beach.

Cadena point (4 miles southward of Aguadilla bay) should not be approached within the distance of a mile. The shore of the bay may be approached within half a mile.

Rincon bay.—The coast at $1\frac{1}{4}$ miles to the S.S.E. of San Francisco point curves in eastward and forms this small bay, which lies between Jigüero and Cadena points, bearing from each other about N.W. by N. and S.E. by S., distant $3\frac{1}{2}$ miles. It is well sheltered from the usual winds, but the ground is foul and offers no good anchorage.

Pelegrino rock.—This rock is said to have 10 feet water over it, and to lie about one mile from the nearest shore with Jigüero point bearing N. $\frac{1}{2}$ W., and Cadena point S.E. by E. Pelegrino rock is not discernible in ordinary weather, caution therefore is necessary when navigating in the vicinity.

Añasco bay is situated immediately to the south-east of the former, between it and Algarrobo point, distant 6 miles. There are many factories in the neighbourhood. The river Añasco empties itself into the bay and has thrown up a shallow bar before it, which extends more than half a mile from the shore; outside this there is well sheltered anchorage with the prevailing winds for vessels of the largest draught. The outer Los Machos, the northern of the outlying shoals off this bay, with only 2 fathoms water on it, must be carefully avoided.

MAYAGÜEZ BAY* lies between Algarrobo and Guanajivo points, and is about 3 miles wide and $1\frac{1}{2}$ miles deep. In the northern part of the bay the depth gradually decreases from 10 to 4 fathoms towards the shore; but shoals extend across the entrance, requiring great attention in

* See Admiralty plan:—Mayagüez bay, No. 479; scale, $m = 1.5$ inches.

working in. The anchorage affords excellent shelter from northerly winds, and admits vessels of any size, and is undoubtedly the best anchorage in the island. In 1863, 347 vessels, amounting to 59,102 tons, of which 91, equal to 12,574 tons, were British, entered inwards; and the total value of the cargoes was 547,286*l*. In the same year 353 vessels, amounting to 60,770 tons, of which 89, equal to 12,366 tons, were British, cleared outwards; the total value of the cargoes being 502,804*l*.

In 1878 the exports from Mayagüez amounted annually to 4,090 tons of coffee and 349,794 gallons of molasses. On an average 752 steam and sailing vessels enter and leave during the year. It is a thriving town with 10,000 inhabitants and very healthy, lighted with gas, and excellent water brought in from the hills by pipes. Tram-cars run from the custom house to the town. Supplies of all kinds are plentiful and cheap. The royal mail steamers call bi-monthly. The pilots do not venture out beyond the shoals. Twenty fathoms was found at one cable S.W. of the inner Los Machos buoy, and no bottom at 10 fathoms in the channel passing one cable south of the buoy; the buoys are all soon made white by the numerous birds.

From Algarrobo point (which may be known by a house with a red roof built upon high piles, on the hill just above the point), the coast of the bay trends to the south-east for $1\frac{1}{4}$ miles to little Algarrobo, a low sandy point, on which there is a sugar factory, with a chimney and some blue buildings around it. There are two sugar factories with high chimneys situated at the northern part of this bay, about a quarter of a mile north of Poca Pta. del Algarrobo. The shore between is foul for 3 cables off, and S.W. half a mile from Algarrobo point lies the reef of that name, which at the outer part is nearly dry and steep-to. A buoy is moored on the N.W. extreme of this shoal.

At about a third of a mile southward of little Algarrobo point, at the head of the bay, is the entrance to the river Mayagüez, in which small droghers lay up for the hurricane season. The river is a ditch of the smallest proportions, almost dry at the entrance; there is an iron bridge across it, and before it is the best anchorage, sheltered from the northward round by east to S.W., with good holding ground. Thence the low shore bends round to the south-west with shallow water some distance off, and North $1\frac{1}{2}$ miles from Guanajivo point a spit runs off nearly a mile from the shore.

Lights.—Two small red harbour lights shown from the wharf serve as a guide to boats at night for the landing-place.

To the eastward of the bay the land becomes elevated, and E. by S. about 8 miles from Mayagüez, and a little to the northward of the paps of Cerro Gordo, there is a remarkable peak called the Cerro Montuoso,

which is distinguished by its summit being crowned with two large trees (the two large trees on the summit of this mountain cannot now be distinguished—1878), that give it the appearance of a double peak, and is a useful object from the offing. The village of Mayagüez is nearly a mile E.S.E. of the entrance of the river.

The Outer Los Machos is the northern and outermost of the shoals at the entrance of Mayagüez bay, and lies W.N.W. about $2\frac{1}{2}$ miles from Algarrobo point. It is about half a mile in extent, in a N.N.W. and S.S.E. direction, with from about 2 to 4 fathoms water on it, and sometimes breaks. The dark discoloured water may be seen at a little distance.

The Inner Los Machos lies three-quarters of a mile S.E. of the outer los Machos and W. $\frac{1}{4}$ N. $1\frac{3}{4}$ miles from Algarrobo point. It is half a mile in extent north-west and south-east, with 2 to 3 fathoms water on it, with a bell buoy near its south extreme. Between it and the Algarrobo reef there is an inner channel a mile wide, with $5\frac{1}{2}$ fathoms in it.

Allart bank.—This bank, on which a Danish frigate of the same name struck in 1833, is about three-quarters of a mile in length north and south, and half a mile in breadth, with from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms water on it, the shallowest part lies N. by W. $\frac{1}{2}$ W. from Guanajivo point and S.W. by W. 2 miles from Algarrobo point, the passage between it and the inner los Machos is 5 cables in breadth, with $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water (H.M.S. *Tourmaline* found no bottom with 10 fathoms in this channel by keeping one cable south of the inner los Machos bell buoy), and is the principal channel leading to the anchorage of Mayagüez. On the north-eastern edge of this bank a red* buoy is placed.

Rodriguez bank.—The northern edge of this shoal is about $1\frac{1}{2}$ miles to the southward of the Allart, just without the line of the bay, and N. by W. $1\frac{1}{2}$ miles from Guanajivo point. It is about half a mile in extent north and south, and dry in several places. Between the Rodriguez and the Allart there is a bar with 13 to 16 feet water over it.

Mayagüez bay.—The channel between Rodriguez bank and Guanajivo point has 13 feet least water and is used only by coasters. Two buoys mark this channel, namely, a red buoy on the west side, moored in 8 feet water, and a black and white buoy on the starboard side in 13 feet. The buoys are 5 cables apart E.N.E. and W.S.W.

Pierre Blanche (white rock) is a small patch of one fathom, lying just within the line of the Allart and Rodriguez shoals, at about an equal distance from each. It obstructs the passage between these banks,

* The colour of the buoys cannot be depended upon. U.S., B.N., No. 12, 1886.

and lies W. $\frac{3}{4}$ S. about 2 miles from the custom house ; it frequently breaks.

Directions.—If the wind will allow a vessel to lay in or out through the main channel into Mayagüez bay, between the Allart and the inner los Machos, should the buoys not be in place, the best mark will be to bring the peak of Montuoso in line with the custom house, bearing E. by S. $\frac{3}{4}$ S. The latter stands on the edge of the shore ; it is a large square two-storeyed yellow building, with a flagstaff over the centre of the roof, and is the southernmost of four large houses distinguished by having flat roofs ; they are, however, so close together, that a vessel will not go wrong by running with either of them in one with the peak. A good mark is Cerro Montuoso peak in line with the northern and higher hummock of a wooded saddle-shaped hill, bearing E. by S. The custom house may also be used in line with the village church, which has two turrets. Either of these marks will lead up to the anchorage off the town, into the depth most convenient. A pier, on which are some sheds with zinc roofs, extends from the custom house. The custom house, when seen from the channel, is not easily recognised by a stranger. The church in line with the peak leads over the bar of the river, but which at times is impassable to boats. To the southward of the group of houses are the barracks, a large flat-roofed building standing on higher ground than the former, which should not be taken for the custom house.

Beating in, a vessel may stand towards the inner los Machos until the custom house and church are in one ; but to the southward, towards the Allart shoal, she must tack before the peak of Montuoso comes in line with the church, until within the two shoals. When the land to the southward of Guanajivo point is shut in with that point bearing South, a vessel will be eastward of the outer banks. Coming from the northward the channel, which has $5\frac{1}{2}$ fathoms least water, may be taken between los Machos and the Algarrobo reef. In this case care must be taken not to haul in round Algarrobo point until the peak of Montuoso opens south of the chimney of Vigo's sugar-house, which is white, and a conspicuous object near the shore, north of little Algarrobo point.

There is said to be good anchorage for large vessels outside, to the westward of the shoals, but it should be taken with very great caution, as it has not been surveyed.

Tides.—The rise and fall in Mayagüez bay is from 2 to 3 feet, but the periods are irregular.

The coast between Mayagüez bay and cape Rojo is foul, and bordered by rocky shoals which extend fully $1\frac{1}{2}$ miles seaward.

Port Real de Cabo Rojo,* about 9 miles S. $\frac{1}{2}$ W. from Mayagüez bay, is almost a circular basin three-quarters of a mile in diameter, with a depth of 16 feet in the centre. The channel, which is very narrow and tortuous, carries 9 feet water, and lies near the south part of the entrance. From the north point an extensive reef runs off, which after skirting cay Fanduco, terminates at Varas point. The inhabitants in this locality subsist chiefly on fish; boats leave here during the season for the turtle fisheries of Mona island.

Boqueron bay.—About 2 miles S. by W. $\frac{3}{4}$ W. from port Real is Guaniquilla point, and between it and that of Melones, $2\frac{1}{2}$ miles farther on, is Boqueron bay. It is obstructed by numerous shoals both within and without. It may be entered by two channels, having not less than four fathoms water, which lead into a spacious and sheltered anchorage.

Boqueron bay appears to be the line of separation as regards the climate and productions of Puerto Rico. On the north side, where there is an abundant rainfall, the country is fertile, covered with trees and rich pasture lands, where cattle feed. To the south, towards point Melones, and having its rise there, is a chain of arid mountains without trees or pasture; an uninterrupted drought does not permit the growth of vegetation on this side, but it will be seen from the following description, that the shoals off this end of Puerto Rico, between Mayagüez and cape Rojo, (the south-west end of Puerto Rico,) are so numerous and so imperfectly known, as to render it not only difficult, but dangerous to approach either of the above places.

Negro shoal is of small extent, and almost always breaks. It lies $3\frac{1}{2}$ miles from the nearest part of the shore, with Guanajivo point bearing E. by N. $\frac{1}{2}$ N., and Jigüero point N. $\frac{3}{4}$ W.

Tourmaline reef.—Westward of Mayagüez an extensive reef, having as little as 4 fathoms water over it and possibly less, was recently passed over by H.M.S. *Tourmaline*. From the reef the peak of Cerro Montuoso bore East; Desecheo island N.N.W. $\frac{3}{4}$ W. The bottom is apparently of coral with remarkable white stripes extending north and south across it; the bottom was visible in 12 fathoms.

Las Coronas are sand-banks about half a mile in extent, which just cover, and sometimes break. They lie to the southward of Negro shoal, with Guanajivo point bearing N.E. $\frac{2}{3}$ N., and Jigüero point N. $\frac{1}{3}$ W. $3\frac{1}{2}$ miles from the coast.

Half-Moon is another shoal said to lie outside las Coronas at 5 miles from the land, and is described as a reef nearly three-quarters of a mile

* See General charts, Nos. 761, 762, and 2,600, sheets 1, 2, and 3.

long north and south, about a quarter of a mile broad, and always breaks. From its north end Guanajivo point is said to bear N.E. by E. $\frac{1}{2}$ E., and Jigüero point N. $\frac{1}{2}$ E. Half a mile E.N.E. of it are dry rocks, over which the sea breaks, but the existence of both rocks and reefs is doubtful.

Guaniquilla shoal,* a rocky ledge about 3 cables in extent with a depth of 3 fathoms on it, lies about 2 miles westward of Guaniquilla point, with Guanajivo point bearing N. by E. $\frac{3}{4}$ E., and Jigüero point N. $\frac{2}{3}$ W.

The Gallardo, lying West nearly $6\frac{1}{2}$ miles from Melones point, is also a rocky shoal of $2\frac{1}{2}$ fathoms, about 3 cables in extent, from which mount Atalaya bears N.N.E., and the south extreme of the Morillos about E.S.E. The latter are some remarkable little hills near cape Rojo, the south-west end of Puerto Rico.

Monte de Atalaya rises near the shore at the north end of Añasco bay, and is the highest and northernmost of two peaks at the west end of the range. It bears about S.E. by E. from Jigüero point, is very remarkable, and does not alter its appearance when seen even from off the south end of Desecheo island (page 220.)

Cape Rojo, the south-west point of Puerto Rico, slopes down from a double-peaked hill to a bold headland, and when first seen from the eastward or the westward has the appearance of two islets lying under high land; when made from the southward two remarkable projecting cliffs will be observed to the eastward of it. A good fishing bank of clear white sand and coral, called the White grounds, extends 8 or 9 miles from the cape, on which the depths are from 6 to 15 fathoms; the edge is very steep-to, and the bottom is visible in 12 or 13 fathoms.

LIGHT.—A lighthouse is erected on cape Rojo from which, at an elevation of 127 feet above the sea, a white light† eclipsed every minute is exhibited, visible 18 miles; the building, rectangular in shape, the tower, 49 feet high and slightly pyramidal, are painted dark grey with white walls.

THE SOUTH COAST of PUERTO RICO is generally foul, and should be very guardedly approached; for, as already observed, we possess very little correct information respecting it. It appears, however, that in some parts soundings extend to a considerable distance from the shore, and the lead should, therefore, be well attended. In running down, it is advisable not to come within 4 or 5 miles of the land. From the offing, this side of the island appears lofty, but the shore is generally low and bounded by mangroves. Sixteen small rivers empty

* The Spanish chart of the island shows no shoal ground in this position.

† This light did not become totally eclipsed at 13 miles distant.—Navigating Officer H.M.S. *Fantome*, 1885.

themselves into the sea from this shore, but few are capable of admitting even boats. There are many small harbours and anchorages under the reefs, known to the fishermen and droghers, and one or two capable of receiving vessels of a large draught. The south coast of Puerto Rico, Lieutenant Zuloaga remarks, is incorrectly shown on the existing charts, and should not be approached within a distance of 6 or 7 miles without great caution. From cape Rojo a broad chain of reefs, known as the Margarita, extends as far as Brea point (entrance of port Guanica); the south extreme of the reef extends fully 4 miles off shore, and forms a point to leeward of the village of Parguera. This chain of reefs affords three passages, which are only accessible to vessels of light draught, and which no vessel should attempt without the aid of a pilot.

Indio passage.—The western passage named Indio is abreast Pitajaya: it is about 2 cables broad and has 7 fathoms of water inside. Anchorage, sheltered from the sea, is found under the lee of these reefs.

Port Guijano.—Near Cabras or Matei island, and about 4 miles eastward of Indio passage, is Faluch, or Middle passage, which trends N.E. and S.W., is 4 cables wide and has $9\frac{3}{4}$ fathoms water. The eastern edge is marked by a small mangrove cay, from which a reef extends to the north-west. Faluch passage, the best of the three, leads to the port of Guijano, which is formed by the coast and an inner line of reefs, and has an entrance having a depth of 7 to 9 fathoms. The port is spacious, deep, and sheltered from all sea.

Terremoto passage.—In the neighbourhood of Salinas bay, between Corcovado point and Terremoto cay (the largest of the outer cays), is the third passage, named Terremoto, where the soundings are $4\frac{1}{2}$ to 7 fathoms, and by which coasting vessels enter Salinas bay.

Port Guanica.*—This port is an inlet about $1\frac{1}{2}$ miles in length in a north-west and south-east direction, and a quarter of a mile in breadth, with a depth of $3\frac{1}{2}$ fathoms water at its inner end and $4\frac{3}{4}$ fathoms at its eastern, over a sandy bottom. It is the best harbour on this side of the island, and lies about 15 miles eastward of cape Rojo. The depths in this port are shoaling on account of the alluvium carried down by the rains. The greatest depth in the harbour is $4\frac{1}{2}$ fathoms in the entrance, diminishing to $2\frac{1}{2}$ fathoms towards the inner part of the port. A mud-bank with a few scattered rocks extending from the north shore almost to the centre of the port, has only 2 feet water.

During the year 1874, 91 vessels, of which 75 were coasters, visited this port.

* See Admiralty plan:—Port Guanica, No. 479; scale, $m = 1.9$ inches.

The exports are sugar, coffee, maize, cotton, and starch.

Its entrance, formed between two bold headlands, Meseta point on the east, and Pescadores point on the west, is little more than a cable wide, and is in the middle or north-west end of a large bay formed between Brea point, a bold and rocky cliff, and Picua point, 3 miles eastward of it.

Close off Picua point are two small islets, called Caña and Caña Gorda. Between them and Meseta point, an unbroken semicircular reef sweeps round outwards to the distance of three-quarters of a mile from the shore, and without this, 4 cables off, there is a detached, narrow, rocky ledge 3 cables long in a north and south direction, with a depth of only 12 feet water on it. The south end of this ledge lies S.S.E., a mile from Meseta point, and on the line between Brea and Picua points, with the south end of Caña Gorda E. by N. The western shore, between Pescadores and Brea points, recedes into a deep bight, which is blocked up by a reef extending across from the former to within a quarter of a mile of the latter, and is steep-to.

Directions.—Approaching port Guanica from the eastward, run down outside the reefs until Meseta point is in line with the western pap of Cerro Gorda, which may be easily recognised. This mark will lead in, close alongside to the westward of the outer ledge in 10 fathoms water. The point on with the eastern pap will lead more in mid-channel, and when Caña Gorda bears E. $\frac{1}{2}$ N. a vessel may steer for the centre of the channel into the harbour. Run boldly through between the entrance points, and take up the most convenient berth within, where there is nothing in the way. The south-west shore is the boldest; but the farther a berth is chosen to the eastward, the easier it will be to sail out. In beating up from the westward, Brea point may be approached without fear, but be cautious of the reef in front of the western bight.

Port Guayanilla, eastward of that of Guanica, is a large bay almost circular, open to the southward, and formed by Majagua point on the west and Peñon de Guayanilla on the east; the former point is skirted by reefs, and the latter surrounded by islets. Several small rivers empty themselves in the bay. There is anchorage in this port in $5\frac{1}{2}$ fathoms water: the entrance is open on a N. by W. bearing.

To the westward of the port the coast is foul.

The town of Guayanilla is situated on the banks of the river of the same name, about $1\frac{1}{2}$ miles from the entrance. It exports sugar, coffee, and maize.

Port Matanza, eastward of port Guayanilla, is another bay somewhat similar, and formed between Peñon de Guayanilla point on the west, and that of Cuchara on the east. At one mile S. W. by W. of the

latter point is an islet called Ratones, which serves as a mark for the port, as also for that of Ponce eastward of it. At the head of the bay the river Peñuelas disembogues.

PORT PONCE* is 15 miles eastward of Guanica, and north-westward 7 miles of Muertos island. The bay of Ponce is nearly 3 miles across between Cucharos the western and Carenero the eastern points; the port is in the north-east corner of the bay, and on its shore is the village of port Ponce, containing 1,500 inhabitants. The custom house, a long white, two-storeyed building, with flat roof and flagstaff, is the most prominent object in the village, and is very conspicuous from seaward. The shores are low and bounded by mangrove and cocoa-nut trees, but 2 or 3 miles westward of Cucharos point the land rises and becomes hilly. Ratones island, lying one mile south-west of Cucharos point, is about 3 cables long and one cable wide, low and covered with brushwood; its surrounding reef, which nearly dries at low water, stretches off south-eastward for 3 cables. Arenas cay, small and bushy, is between Ratones and Cucharos point. Cardones island, 9 cables W.S.W. of Gatas islets off the east point of the bay, is low, covered with brushwood, and in its centre is a wooden house; the reef surrounds the island to the distance of nearly 2 cables, and with that from Gatas islets narrows the channel to nearly half a mile. Cayito reef is a dangerous coral bank which seldom breaks, lying half a mile northward of Cardones island; there are 9 feet on its eastern edge, and probably shoaler water will be found; a white chimney open eastward of the negro huts, near the cocoa-nut grove on the north side of the bay, bearing north, clears the east side of the bank. There is a 7-fathom channel between Cardones island and Cayito reef, but it should not be taken without a pilot. Gatas, 4 small low cays off Carenero, appear as a continuation of that point; its projecting reef, upon which the sea breaks, is steep-to. At the extremity of the reef off Penoncillo point, northward of Carenero, are two small rocks which uncover 4 feet at low water. Cabrillon point lies about three-quarters of a mile eastward of Carenero point; two small islets or cays lie off it:

The town of Ponce, the second in size, third in commercial importance in the island, and numbering 14,000 inhabitants, lies 3 miles E.N.E. of the port. A vice-consul resides in the town, but has an office at the port.

In 1874 the total value of exports was 480,929*l.*; in that year 256 vessels of 52,127 tons entered inwards, of which 76 of 15,471 tons were British. The law holds the masters of vessels responsible and liable to fines for any false declaration in contents, quantity, weight, or measure.

* From the survey and remarks of Navigating Lieutenant G. H. Stoaite, R.N., H.M.S. *Druid*, 1874. See Admiralty plan:—Port Ponce, No. 500; scale, $m=3$ inches.

The supply of coal and wood is uncertain. Water is scarce and bad.

Tasmanian shoal (or Brillante),* on which the royal mail steam vessel *Tasmanian* recently grounded, has $3\frac{1}{2}$ to 5 fathoms water over it; this shoal ground is nearly circular with a diameter of about 3 cables.

From the shoalest part, situated about a mile S.S.E. $\frac{1}{2}$ E. from Cardones island, the centre of Ratones island is in line with a remarkable fall in the hills bearing W. by N. $\frac{1}{2}$ N., and a conspicuous clump of trees on the middle (the second) range of hills behind the town is in line with the east extreme of Ponce village N. by E.

The conspicuous clump of trees in line with the house of the captain of the port (the house next west of the custom house) bearing N. by E. $\frac{1}{4}$ E. leads westward of the shoal. The saddle hill, nearly on the same line of bearing, and given as a leading mark on the chart, is not easily distinguishable.

Eastward of Tasmanian shoal, a quarter of a mile distant, is another patch of shoal ground; this is about 2 cables in diameter, with $3\frac{3}{4}$ to $4\frac{1}{2}$ fathoms water on it. There is a depth of $6\frac{1}{2}$ fathoms between the two shoals.

Directions.—Shoal and uneven soundings exist southward of the bay for some distance from the shore, probably on irregular banks extending from Ratones island on the westward, and from Muertos island on the eastward, leaving a deep channel between them into the port, eastward of Cardones island. Approaching from the westward, the custom house open of the east end of Cardones island bearing N.N.E. $\frac{1}{2}$ E. crosses the bank in $5\frac{1}{2}$ fathoms, and on nearing Cardones, open the custom house to N. by E. $\frac{1}{2}$ E. From eastward, round Hammock cay, off the south-west end of Muertos island, at the distance of three-quarters of a mile, and steer N.W. by W. $\frac{1}{4}$ W.; on nearing the port the shipping and upper part of the custom house will be seen over the low mangrove trees, and small vessels may cross in 4 fathoms water, with the custom house in line with the west end of Gatas islets. The custom house in line with the saddle in the first range of hills behind it bearing N. by E. $\frac{1}{4}$ E. leads over 7 fathoms. Large ships should bring the custom house to bear N. by E. $\frac{1}{2}$ E., on which bearing the least water will be 13 fathoms, and when abreast of Gatas steer North to the anchorage. The edge of the bank is $1\frac{1}{2}$ miles southward of Cardones island. Pilots can always be obtained, but they only board vessels when off Cardones.

LIGHT.—A small square tower is erected on the upper part of the harbour-master's office at port Ponce, from which a fixed red light is shown

* A Spanish authority of 1885 gives as little as $13\frac{3}{4}$ feet on the east end of the Tasmanian (or Brillante) shoal.

at an elevation of 39 feet above the sea, and should be visible 12 miles in clear weather.

Directions.—Vessels approaching port Ponce should not come within 5 miles of the land, until the lighthouse bears N.N.E., which should then be steered for; when abreast of Cardones islet alter course to N. by E. for the anchorage. In 1880 the masts of the wreck of the steamer *Tasmanian* were two-thirds above water.

The land breeze often sets out between sunset and sunrise. The custom house is in latitude $17^{\circ} 58' 51''$ N, longitude $66^{\circ} 39' 30''$ W.

Tides.—It is high water, full and change, in Ponce harbour at 2h. 0m. (approx.) and the rise 2 feet, but they are very irregular.

Muertos or Dead Chest island lies nearly midway off the southern side of Puerto Rico, 4 miles from the shore, and 36 miles from cape Rojo; it is $2\frac{1}{2}$ miles long north-east and south-west, and may be seen in clear weather at a distance of 15 or 16 miles. It takes its name from its north end having the appearance, at a certain distance from the eastward and westward, of a coffin, or more properly a gun quoin with its thick end to the south, which is of considerable elevation. The centre part of the island is low and sandy, and the south end terminates in a lofty rocky peak, which, at a distance, has the appearance of a separate islet. It is nearly connected to Puerto Rico by a reef, which commences at the north-east end of the island, and on it the sea in general breaks heavily. This reef appears also to skirt the east and south sides, and from the latter it stretches off half a mile

At about a cable from the south-west end of the island there is a small flat cay called the **Hammock**, which should not be rounded within the distance of three-quarters of a mile. Two cables south-westward of the cay there is said to be a rock with 8 feet on it.

Wood and Water.—Firewood is to be obtained on Muertos island, and water will be found by digging wells in the sandy beaches a little above high-water mark.* There is also good fishing, and plenty of turtle at the proper season.

Anchorage.—The western side of Muertos island is free of danger, and affords fair anchorage in from 7 to 12 fathoms water. A good berth may be taken with the north-west point of Muertos in one with the northern hill bearing East, in 8 fathoms, sand, at about half a mile from the shore; or with the western extreme of Hammock cay S. by E. $\frac{3}{4}$ E. distant $1\frac{1}{2}$ miles, and the north point of Muertos N.E. $\frac{1}{2}$ E. Off the low land of the

* It is reported that wells so dug yield only salt water.—Lieut. D. I. N. Zuloaga, Spanish Navy.

island the soundings are regular, but farther north the depth is much greater, there being 17 fathoms close to the shore. South and south-west of the island the bottom is very uneven, 5 miles S.S.W. a depth of 17 fathoms will be found, and, half a cable outside, no bottom at 200 fathoms.

Berberia cays.—Three miles E.N.E. from Muertos island are two cays named Berberia, and in their neighbourhood are many dangerous banks, very imperfectly known. With the island bearing West, distant 3 or 4 miles, the depth is 6 fathoms. From the hills white water is seen a considerable distance to the eastward; the lead must, therefore, be well attended. The cays are joined by a reef. From the larger and northern cay a shoal of considerable size extends north-west and south-west, on which there is only 6 feet water. These two cays are often submerged, and are dangerous to approach on the west and south sides; but to the northward of the larger there is good anchorage in $4\frac{1}{2}$ to 7 fathoms, mud.

There is said to be a clear channel north of Berberia cays with $5\frac{1}{2}$ fathoms least water.

Port Jacaqua is 3 miles eastward of Cabullon point, and in front of the mouth of the river Jacaqua. To the westward of the river are two small islets named Frio, and various reefs. There is no difficulty in reaching this anchorage, the lead is a sufficient guide, and the soundings diminish gradually from $6\frac{1}{2}$ to $3\frac{1}{2}$ fathoms.

Boca Chica.—This small trading place is $4\frac{1}{2}$ miles northward of Muertos island, and it is said that there is no danger in approaching it. The soundings gradually decrease from 7 to 4 fathoms as the Puerto Rico shore is approached, and the lead must be the guide. At 3 miles eastward of the Boca Chica, and N.N.E. of Muertos island, is the port of Patillo.

Coamo bay is skirted by a reef in all its length, and is formed on the west by the point of the same name, and on the east by that of Petrona, distant from the former $5\frac{1}{2}$ miles. The river Coamo empties itself into the bay. Several small islets lie near Coamo point, and 2 miles south of it the two islets or cays of Berberia, with dangerous banks near them, where the sea often breaks.

Port Salinas de Coamo is a safe reef harbour, about 14 miles eastward of Muertos island, which is in sight from it. Its entrance may be known by several small cays near the west side of Arenas point, and a guard-house, which will be seen when approaching them. The channel lies between the outer or westernmost cay—which is about 4 miles to the southward of the guard-house—and a reef, $1\frac{1}{2}$ miles westward of it, on which the sea always breaks. In November 1860 the *Nina*, Spanish store ship, struck on a rocky shoal within the harbour, having $16\frac{1}{2}$ feet water on it and 22 feet around. It lies with the middle of the round

cay at the entrance to the channel between the coast and islets bearing N.N.E. $\frac{1}{4}$ E., and the south extreme of Saso cay S.W. $\frac{1}{3}$ S.

Water.—There is a good watering place in port Salinas de Coamo on the shore near a lagoon, about half a mile to the westward of the guard-house.

Port Aguirre lies at the head of the bay, between Arenas point on the west, and Colchones point on the east.

Directions.—Discoloured water extends off a considerable distance from the cays off port Salinas de Coamo, and 3 miles off the depth is 10 fathoms, which will decrease to 7 fathoms as the shore is approached. Having rounded the western cay at the entrance, at the distance of a cable, steer boldly in between the eastern cays and the reef, towards the guard-house, and anchor in 4 or 5 fathoms water, with the latter bearing N. $\frac{1}{2}$ E. about one mile distant. In leaving the anchorage, if bound to the westward, stand to the southward for 2 or 3 miles from the cays, or until Muertos island bears northward of West, before keeping away.

Boco de Infierno or Port Jobos.— $5\frac{1}{2}$ miles eastward of port Salinas de Coamo is the Boco de Infierno or port Jobos, formed between Colchones point on the west and that of Pozuelo on the east. The eastern part of the port, which appears large, is sheltered by a long tongue of land or peninsula running east and west. To the eastward of the Boco de Infierno the coast forms several bays, but affords no anchorage.

Guayama, although merely an open roadstead, is secure with the ordinary winds, and much frequented. The anchorage possesses excellent holding ground, and is protected to the eastward against the trade winds by a reef, 3 miles in length, which extends between 3 and 4 miles from the shore. It lies about 12 miles westward of cape Mala Pascua, and may be recognized from an offing outside the reef by a guard-house on the shore, which bears about N. by E. from the west end of the reef, and a windmill on a hill a mile to the westward of it. To the eastward of the reef, between it and the cape, the depth is from 10 to 7 fathoms at 2 or 3 miles from the shore; and 13 fathoms at a mile outside to the southward of it. As the anchorage is approached the soundings become very irregular, varying from 5 to 8 fathoms until within the reef, when they gradually decrease as the shore is neared; the lead must therefore be well attended.

Directions.—When approaching Guayama roadstead from the eastward,—or indeed if bound to either of the ports on this side of the island

rom that quarter,—cape Mala Pascua should be given a berth of 4 miles, and when it bears to the eastward of North, the Guayama reef will generally come in sight from aloft. Shape the course to pass well outside, paying attention to the lead, and when the guard-house bears N. by E., haul in towards it, under the west end of the reef, and steer boldly in. The best anchorage will be found in 4 fathoms water, about a mile from the shore, with the guard-house on the same bearing, and the west end of the reef S. by E. In leaving the bay, if bound westerly, steer out S.S.W. ; but a good offing must be obtained before bearing up, in order to avoid the cays and reefs to the westward.

Vessels when passing along the south coast of Puerto Rico, and in the vicinity of Arroyo bay, should exercise great caution, in order to avoid the dangers fringing the shore.

It is recommended after passing the meridian of Pozuelo point, to keep southward of the parallel of $17^{\circ} 55' N.$, until well eastward of the meridian of Arroyo, when cape Mala Pascua may be gradually approached; this cape, however, should not be passed within a distance of two miles.

Arroyo is a small bay about 3 miles to the north-east of Guayama anchorage, and may be recognized by the village, standing about 3 or 4 miles inland, and visible 12 to 15 miles off. A white church stands on a hill above the village, and has a square tower on its west end and a small cupola on its east. The anchorage may also be recognized by the custom house, a large yellow building. To enter the bay, bring the centre of the village to bear N.N.E., and steer in on that course to avoid a bank with $3\frac{1}{2}$ fathoms water on it, which lies about 3 miles south of the bay. This bank is a spit that runs from the reef to the eastward, and by keeping the village of Arroyo bearing N. by E. it will be cleared. A vessel should anchor south of the custom house, about three-quarters of a mile from the shore. The next port to the eastward is Patillas, which, with the Guayama reef, is mentioned at page 197.

Winds.—The winds around Puerto Rico appear to be of the same character as those met with at the Virgin islands. There is no regular land breeze to take advantage of, although the usual trade wind generally slackens during the night in the immediate vicinity of the shore. Under the west end, the wind in the day time will incline inward. In the winter months north and north-west winds sometimes occur, and blow hard; and in the summer, long calms and light south-east airs prevail, with terrific squalls and heavy rains, especially on the south side. From the absence of any remarks on the rollers we may conclude that they are at least not so heavy or so dangerous as at the Virgin islands.

Currents.—On the north side of Puerto Rico, the current is said to incline generally to the south-west or towards the shore, and to run with

greater velocity in the winter than in the summer months. On the south side its course is generally West, but its movements are here uncertain. Some navigators state that at the full and change of the moon a strong weatherly set will occasionally be found, especially if light winds or northerly winds have prevailed near these periods, and consequently gives great assistance to vessels beating to windward. In February it has been found running a knot an hour to the northward; in the summer months it will incline to the north-west towards the shore, and round the south-west end into the Mona passage with great force. This is probably owing to the large body of water thrown out at this season, from the great rivers of Terra-firma.*

THE MONA PASSAGE.

This passage between Puerto Rico and Haïti or San Domingo is about 60 miles wide, and receives its name from two small islands named Mona (ape) and Monito (little monkey), which lie nearly midway at the south entrance, between cape Rojo and Saona island.

MONA,† the largest of these islands, is 6 miles long in a north-west and south-east direction, and about 3 miles broad. Its north and east sides are formed of white perpendicular cliffs about 175 feet high, whilst the south and west coasts are from about 80 to 105 feet high; its summit is nearly flat, covered with brushwood, grass, and some trees of considerable height, and may be seen 18 miles off. The island is of volcanic formation, and the surface is composed of a calcareous rock which is full of holes containing soil on which the brushwood and trees grow. On it are a number of wild goats, hogs, large sea birds, and tortoises. On the north-west and south-east coasts there are a great number of grottoes or caves forming entrances to extensive subterraneous galleries which run in every direction, and in some parts are so obstructed by stalactites and stalagmites that it is almost impossible to pass. From the cliff at the west end, a low sandy spit, also covered with stunted wood, projects off some distance. A ridge of rocks runs $1\frac{1}{2}$ cables off this point; and in rounding it at the distance of a quarter of a mile there will be 8 fathoms water, and a vessel should not come within this depth.

The eastern and northern parts of the island are said to be clear of danger and steep-to. The north-west end terminates in a promontory and its extremity rises to a lofty perpendicular rock, which when on a N. $\frac{1}{2}$ E. or S. $\frac{1}{2}$ W. bearing, has the appearance of a sail, with Monito open westward of it.

* Sir R. H. Schomburgk, 1850.

† The position of this island has been reported to be inaccurate. See Admiralty chart 479, with plan of Mona island; scale, $m=0\cdot5$ inch.

From this end, named cape Barrionuevo, round west and south to the east end, the island is bordered by a bank of white sand and rocks with from 18 to $3\frac{1}{2}$ fathoms water on it. It extends off $1\frac{1}{2}$ miles between capes Barrionuevo and Julia, and to half a mile between this latter cape and the east end of the island. Within the line of $3\frac{1}{2}$ fathoms water there are several heads of rocks, and the south-western shore is skirted by a broken reef, dry in places, to the distance of $1\frac{1}{2}$ cables, through which a boat may with difficulty pick its way to the landing. The best opening will be found with the south-west end of the cliff bearing E.S.E. In the centre of Santa Isabel bay, south-east of the western point, there is a clear beach about three-quarters of a cable in length, where a landing may be effected under favourable circumstances by veering the boat in from a grapnel. The points forming this bay are shallow.

Water.—A little to the right of the landing on Mona island there is a pathway leading to water under the southern cliffs, and here firewood will be found. Indifferent drinking water will also be found in the lower parts of the grottoes.

Cape Julia (known also as Caigo ó no Caigo point), situated on the south-west side of Mona island; it is readily recognised, being surmounted by a large rock which is very curiously balanced.

Santa Isabel bay.—The soundings in Santa Isabel or Uvero bay, on the south-west side of the island, are regular, and a vessel can stand in without risk to a depth of 6 or 8 fathoms, and then anchor.

The bottom is of sand with many patches of rock; the holding ground is bad and a sea always sets in.

Vessels should be prepared to leave this anchorage on the first indications of an approaching gale from the westward, or when South or S.E. winds set in.

El Sardinero.—A more secure anchorage, known as El Sardinero, is found on the bank at the N.W. point of the island, between West point and Cape Barrionuevo; with southerly winds the sea is smooth.

The bottom all over this anchorage is of white sand, and the depth from 8 to 12 fathoms.

It is necessary to stand well into the shore before anchoring, as the bank falls steeply to seaward.

On the parallel of cape Barrionuevo the water is deep and the bottom rocky.

Landing.—In both Santa Isabel and El Sardinero anchorages, the beaches are so foul that landing can only be effected with great risk.

In Santa Isabel bay there are several boat channels through the off-lying reef, and there is also one in El Sardinero anchorage; assisted by the knowledge of the fishermen a boat may land unless the sea is heavy.

Caution.—During the season of northers both these anchorages should be avoided, as a heavy sea prevails.

Directions.—Approaching the anchorage off Mona island from the southward—having rounded the ledge off the west point, as directed above, and brought it to bear East—haul up, and if the vessel cannot fetch it, stand freely to the northward; but on the southern board take care not to bring the west point to the westward of S. by W. to avoid the reef which skirts the shore.

Tides.—It is high water, full and change, at Mona island at 6h. 15m., and the rise is about 2 feet. The flood sets N. by E. and the ebb S. by W., at the rate of half a knot an hour.

MONITO* lies about $2\frac{1}{2}$ miles N.N.W. of Mona, with a clear channel between them. This little islet is somewhat circular, about 2 cables in diameter, and its sides are composed of steep inaccessible cliffs, but much lower than those of Mona. It is quite barren, and frequented by numerous flocks of sea birds. At a distance its summit has the appearance of a shoemaker's last. There are 20 and 25 fathoms water at half a cable from the west side of the islet. The only place where landing can be effected under favourable circumstances, but with much risk to the boat, is at a rock on the west side of the islet. Here, in a small angle or indentation of the shore, vessels have anchored for guano in a depth of from 30 to 36 fathoms.

DESECHEO or ZACHEO, the other island in this passage, lies N.E. by E. about 26 miles and in sight from Mona, and W. $\frac{1}{2}$ N. $11\frac{1}{2}$ miles from Jigüero point, the west extreme of Puerto Rico. The island is about a mile in circumference, and almost entirely composed of a remarkable lofty wooded hill, which may be seen at a distance of 36 miles. The few dangers which lie close to the shore always show themselves, and are steep-to. When seen from the south-west the south side appears very precipitous; but from the northward it appears more lengthened out, and it will be found a very useful object in navigating the western side of Puerto Rico. There is no anchorage under it.

Directions.—The Mona passage is very frequently chosen by vessels proceeding from North America to the ports on the Spanish main, and the islands to leeward of it; and by those from Europe bound to Jamaica, or the ports on the south side of San Domingo and Cuba; espe-

* See Admiralty charts Nos. 761, 762, and 2,600, general charts only.

cially in the winter season, when the wind hangs to the northward of East. In some cases the voyage from North America will be somewhat lengthened, but the security it offers fully compensates for the great risk incurred in the shorter route through the Bahama channels. Vessels from Europe must be careful not to pass to the southward of lat. 19° N. until they are well assured of being to the westward of Anegada. It has been stated that there is no danger to be feared in the Mona passage; we must, however, caution the navigator not to be too eager to keep away, and to give Saona island, which is low and foul, a berth of at least 4 miles. He must also be very watchful of the heavy squalls which are met in this opening, particularly in the summer, when they assume the character of tornados, and oblige the sail to be reduced quickly to bare poles; appearances generally give sufficient warning of their approach.

It will always be more prudent to keep the Puerto Rico side aboard, where a vessel will be less influenced by current and tidal stream. This, however, requires caution, for, as we have shown, the west side of this island is imperfectly known, and evidently dangerous.

Current and Tidal Streams.—In the middle of the Mona passage the general direction of the current is to the south-west; but near the coast of San Domingo it sometimes runs at the rate of one or $1\frac{1}{2}$ knots an hour, to the north and north-west. The tidal streams also run with great velocity, particularly on the San Domingo shore to the southward of cape Engaño, where, in the month of May, they have been known to run $3\frac{1}{2}$ knots an hour; the flood to the south-west for 9 hours, and the ebb 3 hours to the north-east. At some periods the duration is directly opposite, and at others they run the usual time of 6 hours each way. This great irregularity is probably the cause of the accidents which sometimes occur in this neighbourhood.

CHAPTER VI.

THE GREATER ANTILLES—HAÏTI OR SAN DOMINGO
AND THE WINDWARD PASSAGE.

VARIATION IN 1887.

Cape Engaño -	- 0° 20' E.		Cape Tiburon -	- 2° 5' E.
Cape Isabelle -	- 0° 40' E.		Alta Vela -	- 1° 30' E.

HAÏTI OR SAN DOMINGO.*

On the discovery of this island by Columbus, on his first voyage, it was named by him Hispaniola, or New Spain, but soon after the establishment of the first settlement on the south side of the island by Ovando, it received the name of Santo Domingo, which was that given to the city built there by him. After the expulsion of the French in 1803 from the western portion of the island, it received its present general name of Haïti, although the eastern portion is still styled by its present possessors San Domingo. This island is considered the most fertile of the Antilles, yet only the western part is cultivated, being the most populous; in the eastern part there are only a few fields of maize, plantains, &c. It abounds in wood and every description of mineral.

Haïti ranks the second in size of the greater Antilles. The population may be estimated at about 800,000, of which two-thirds are in the western or Haïti division of the island. Its form is very irregular, and its shores are in many parts deeply indented, particularly at the east and west ends. Its extreme length from east to west is about 350 miles, and the greatest breadth, which is nearly in the middle between Alta Vela and cape Isabelle, about 150 miles; but for some considerable distance the east end is not more than 40 miles across, and the west end from 15 to 25 miles. It is exceedingly lofty, the Cibao, a great range of irregular mountains, which occupies the middle portion of the island, rising near the centre, at the peak of Yague, to the height of about 7,560 feet.

Saona island.†—The south-east end of Haïti may be said to terminate at the island of Saona, for the space between them is so

* See Admiralty charts:— Nos. 761, 762, 486, and 393. General charts.

† The description of the east end of Haïti is drawn up chiefly from sketches and remarks made by Sir R. H. Schomburgk in 1850. See "Nautical Magazine," vol. xxii.

obstructed by reefs and mud-banks, as to leave only a passage through for boats. Saona island is covered with trees, and in an E.S.E. and W.N.W. direction is about 16 miles in length, and 5 miles wide. The north-east point is composed of bold, rocky cliffs, of moderate elevation, but its south-east point is low, and from it a dangerous rocky ledge stretches off in that direction, to the distance of $1\frac{1}{2}$ miles; the sea breaks within a mile of the shore, and beyond that distance the depths are 4 and 5 fathoms. At 5 miles from the south side of the island there are from 7 to 10 fathoms water. At the south-west end of the island there are several islets.

Shoal.—The Spanish Government has given notice of the reported existence of a shoal lying about 9 or 10 miles south-west of Saona island, south coast of Haïti.

This danger, on which the Spanish brigantine *Ariña*, drawing 9 feet, is stated to have struck on 24th November 1879, is reported by the master of that vessel as having about 10 feet over it, also that no change in the colour of the water in the vicinity was apparent, and that immediately after striking, bottom was not reached with 23 fathoms of line.

The assumed position is in about lat. $18^{\circ} 3' N.$, long. $68^{\circ} 52' W.$

Anchorage.—There is good anchorage about 3 miles to the westward of the south-east point of Saona, off a sandy beach, in Cabello bay; be careful, however, to avoid a dangerous shoal with only 6 feet water on it, lying about 2 miles to the southward of the bay, where the sandy beach ends and the shore becomes rocky, and on which the sea breaks in heavy weather; and also another shoal a quarter of a mile N.W. of it, with from 9 to 18 feet, and deep water between them. The west end of the island is also foul, and a reef extends from it to the north-west, towards Palmilla point, which should be cautiously approached in beating up from the westward; there is a passage between it and the point for boats.

Water and Wood may be obtained at the above anchorage.

Catalinita island.— $5\frac{1}{2}$ miles N.W. from the north-east end of Saona is the island of Catalinita; from it a dangerous horse-shoe reef extends towards Saona, through which, in a cut near the latter, a depth of 6 fathoms may be carried into a sheltered anchorage on sand and mud, with Catalinita bearing N. by E. The north shore of Saona is bold until the reef is approached; but the sea rolls in so heavily, and the currents run round this end of the island with such force and uncertainty, that this bight had better be avoided altogether, and the island not approached within 4 or 5 miles. Catalinita is also nearly connected to San Domingo by a similar reef, extending off from Granchora point, leaving a channel near the islet, but too dangerous for any but coasters to attempt.

The EAST COAST of SAN DOMINGO from cape Falso,—which lies about 11 miles to the northward of the north-east point of Saona,—trends to the northward for 3 miles, and is formed of remarkable limestone cliffs from 150 to 220 feet high; it then turns abruptly to the E.S.E. as far as Espada point, 8 miles distant. Off this coast a strong westerly set is often experienced.

River Yuma or Higüey is at the bottom of the bight formed between cape Falso and Espada point. There are generally $8\frac{1}{2}$ or 9 feet water on the bar, and 12 feet within. To the eastward of the entrance, off the sandy beach of Playeta, there is an exposed anchorage in 12 fathoms.

Water.—Good water may be obtained by ascending the river Yuma in a small boat as far as the Embarcadero, or shipping place for mahogany.

Cape Engaño.*—Espada point is a remarkable bold cliff of moderate height, and from it the coast trends N.N.E. nearly 17 miles to cape Engaño, the extreme east end of San Domingo, which terminates in a long low point, and from it a ridge of rocks extend 3 miles to the north-east. The land rises a short distance from the cape into two small hills, which, when seen on a W. by S. bearing, about 18 miles distant, have the appearance of a wedge. It has been reported that this cape is laid down too far to the eastward. In clear weather, this end of the island may be seen from Puerto Rico.

White grounds.—The coast between Espada point and cape Engaño is low, and soundings are said to extend some distance from it on a bottom of white sand, which discolours the water. The banks of this nature are numerous off different parts of the coast of San Domingo, and receive the name of Placeres blancos or White grounds. They are not, however, always composed of clear sand, but in many parts interspersed with small sharp-pointed rocks, which are not easily seen.

Anchorage.—This part of the island abounds in mahogany, and between the point and the cape are several small sandy bays from whence it is shipped; but the shore being skirted by a broken reef, and completely exposed, they are not only difficult of access, but dangerous to approach, even in the fine weather months.

Small vessels of 6 feet draught may find their way through several cuts, into tolerable shelter for landing within the reef; but large vessels are obliged to anchor a mile or more outside, and accidents frequently occur. In the winter season, communication with the shore is sometimes impossible for weeks, and vessels are occasionally obliged to leave without

* The native pilots call cape Engaño, of the present charts, point Espada, and the latter cape Rafael. See Admiralty chart :—West Indies, Sheet II., No. 393; scale, $m=0\cdot06$ of an inch.

being able to take on board any cargo at all. The best sheltered spot appears to be off the river Yuna, above mentioned.

The coast from cape Engaño to cape Rafael trends nearly in a straight line to the north-west for nearly 45 miles. This space also abounds in mahogany, and is very similar in character to that just described, except that the broken reef which skirts it appears to extend to a greater distance off shore. There are several openings which admit droghers to shelter off the loading beaches, but being entirely exposed to the north-east, the anchorage on the bank outside is only safe for large vessels in those months when the trade wind veers to the southward of East, and then it requires good, and plenty of spare ground tackle.

Cape Rafael.—The extreme of this cape is very low, but about 2 miles inland, and to the southward of it, there is a remarkable isolated conical hill of considerable elevation, called mount Redonda or Round hill, which, at a distance from the north-west and south-east, has the appearance of a detached island. The coast here is unhealthy, and being low, it should not be approached within 4 miles.

Cabeza de Toro is the first landing-place north-west of cape Engaño. There are two cuts in the reef off it, and in the leeward one, called la Nayba, a depth of 10 or 12 feet may be carried through. Large vessels anchor outside the reef in 10 or 12 fathoms, over a bottom of sand and rock. Large quantities of mahogany are shipped at this anchorage.

Babaro, about 3 miles from the above, is considered a somewhat safer anchorage, as the reef lies closer to the shore, and the sea is smoother. The anchorage for large vessels is in 10 or 12 fathoms, at from one to $1\frac{1}{2}$ miles from the land. The beach is sandy and the loading may be effected with rapidity when there is no north-easterly wind or heavy ground swell.

Los Ranchitos, 4 miles beyond Babaro, has two small openings before it, but with only 4 or 5 feet water in them, and the best anchorage is about 2 miles off shore.

Areña Gorda, about 2 miles north-west of Los Ranchitos, has three passages through the reef, and a small vessel drawing 5 feet water can safely pass to the anchorage within. Vessels of large draught lie in from 10 to 12 fathoms at about 2 miles from the shore.

Macao, between capes Engaño and Rafael, is a small bay about 2 miles wide and one mile deep. It is protected on the north by a reef, which connects itself to two remarkable small rocky islets high out of the water, which are good landmarks for the place. The eastern one, called the

windward Cabezote, lies close off Macao point, leaving a boat channel between; the other, el Infiernito, lies about half a mile from the shore, and to the eastward of the entrance to the river Anamuya, before which there is an extensive oyster bank. There is also a boat channel close to leeward of the Barlovento, and the anchorage is about half a mile to the northward of the reef.

There is no opening or safe anchorage between Macao and cape Rafael.

GULF OF SAMANÁ.*—From cape Rafael the shore turns abruptly to the westward, and runs almost straight in that direction for 40 miles; it then bends short round to the northward for 10 miles, where the peninsula of Samaná projects eastward for nearly 30 miles, terminating in a high bold headland 21 miles N.W. from cape Rafael, and forming the great bay or gulf of Samaná.

Port Jicaco, or English harbour, lies about 7 miles westward of cape Rafael, and its entrance is pointed out by a remarkable islet or rock near it, which may be seen 6 miles off, and which also directs to the windward and leeward channels. To run in, bring a lofty double-peaked mountain inland to bear S. by W. Keep the islet or rock between the peaks, and anchor in $5\frac{1}{2}$ or 6 fathoms water, within the reef and about half a mile from the shore. Great precaution is necessary, and a stranger should not run to leeward of cape Rafael without a pilot.

Medina Luna, Bardo Perdido, and other shoals, bar the entrance to Samaná bay, between cape Rafael and the Levantados cays; there are several deep-water tortuous passages through these reefs, but a glance at the chart will deter any attempt at using any one of them; the only safe course is to the northward of the Levantados cays. This bay was surveyed by Commander W. R. Bridgman and the officers of the U.S.S. *Despatch*, in 1882, but beyond the elaborate survey little is known of this bay. The principal places visited by coasters on the southern shore are Savana la Mar and the bay of San Lorenzo or Perlas.†

The River Yuna, the most considerable stream at this end of the island, flows into the western end of the gulf of Samaná, and drains the great plain of la Vega; and having but 4 or 5 feet water on the bar, it is only navigable for boats, which may ascend to within a short distance of Cotuy, a town about 40 miles in the interior.

* See Admiralty chart No. 2,343 :—Samaná bay; scale, $m = 0.45$ inch, with enlarged plans and sketches.

† See Plan on Admiralty chart—Plans of ports in San Domingo, No. 2,406, San Lorenzo bay; scale, $m = 3$ inches; also chart of Samaná bay, with enlarged plans and views, No. 2,343; scale, $m = 0.45$ inch.

Samaná peninsula.—The east end of this peninsula terminates at cape Samaná, which forms a bold double cliff of moderate elevation, the upper rising a short distance within the summit of the lower. These cliffs which are red and steep-to, extend about 2 miles, to the south, where the land is 833 feet high abreast of Vaca point. At about one-third of a mile southward of Vaca point and close to the shore, there is a remarkable spout, resembling continuous jets of steam, occasioned by the rush of water into a subterranean cavern; this spout was seen from the *Druid* when 7 miles southward of it. At about three miles to the westward of the cape, between Balandra head on the south, and cape Cabron on the north, the peninsula is 10 miles across, and this is about its general breadth.

Coast.—Between Balandra head and Santa Barbara, numerous huts and cultivated patches of ground are situated near the shore.

The shore between capes Samaná and Cabron, which bear N.W. and S.E. from each other, $4\frac{1}{2}$ miles apart, forms a deep bight in which are several small cays skirted by a reef. The latter cape also terminates in a remarkable white perpendicular cliff, and 5 miles to the south-west of it is a coned-shaped peak 1,926 feet above the sea, to the S.W. of which peak are two others close together, 1,658 and 1,850 feet respectively, and two miles south of these two latter is mount el Pilon de azucar (Sugar-loaf), a conspicuous peak, reaches 1,612 feet above the sea. About 2 miles southward of cape Samaná the bold rocky shore takes a south-west direction for $6\frac{1}{2}$ miles to Balandra head; the latter is a remarkable red cliff lying at the foot of mount Diablo, which, at $1\frac{1}{2}$ miles from the shore, rises to a peak 1,300 feet high.

About half a mile to the north-east of the head, at the south end of a small sandy bay, there is a remarkable cliff, with three large fissures, and between it and the head, a cable from the shore, lies a small rocky islet called Grapin cay. A small reef breaks at a short distance off cape Samaná, but the shore just described is clear and steep-to, until abreast of Balandra head, off which there are two small cays, the depth here decreases suddenly to $6\frac{1}{2}$ fathoms a mile off, on the Canandaigua bank, which extends from Balandra point $5\frac{1}{2}$ miles to the S.E. This bank is narrow, with $5\frac{1}{2}$ fathoms least water over it.

Shoal.—A shoal of $5\frac{3}{4}$ fathoms, coral and sand, was found at the entrance to Samaná gulf when southward of Canandaigua shoal. From this depth, cape Samaná bore N. by W. westerly and the south extreme of the largest Levantados cay bore W. $\frac{3}{4}$ N.; westward of this position the depth gradually increased to 8 fathoms, and eastward of it more rapidly to 13 fathoms.

There was no discolouration of water over this shoal, but there were indications of its being connected with the extensive bank stretching from the south side of Samaná bay.

From Balandra head the coast turns sharply to the westward, and at $1\frac{1}{2}$ miles beyond it is Cocoa point, a low bluff on which there was formerly a battery of five guns to protect the entrance into the gulf (no remains of this battery visible in 1881); foul ground extends about a cable from the point. One and a half miles farther westward is (Flechas point) Bomhome point, on which there are some huts, and a little eastward of it two small cays, the larger of which is called by the same name.

Levantados cays.—Nearly a mile from the south shore of Samaná peninsula, and about 3 miles westward of Balandra head, are the Levantados cays. The largest is nearly half a mile long east and west, a quarter of a mile broad, 150 feet high, and thickly wooded. About a cable eastward of it is Chinchilline, a small low cay; and at about 2 cables northward of it Pascual, a small round islet, steep-to on its north side. About a quarter of a mile to the north-west of the latter is Jean Bart reef, on which there are $3\frac{1}{4}$ fathoms water; between it and the north shore the channel is about half a mile wide, with irregular soundings, varying suddenly from 6 to 12 fathoms.

From Bomhome (Flechas) point the shore trends to the north-west for a mile, forming the Carenero Chico bight; in its centre are the Chico reefs, which extend out nearly three-quarters of a mile from the shore, are steep-to and easily seen. There is anchorage under Bomhome (Flechas) point between it and the reef, and also in the west end of the bight, which is protected by the reef. The channel into the latter lies to leeward of the reef, between it and a ledge which runs off from Carenero Chico cay, but it is so narrow that large vessels must tow or warp in. About half a mile southward of the Chico shoals there is a patch with a depth of $4\frac{3}{4}$ fathoms, but its position is doubtful.

Shoal.—The position of the shoal reported to lie about two-thirds of a mile south of Carenero Chico cay, was examined by H.M.S. *Druid*. A depth of $4\frac{1}{2}$ fathoms was found on this shoal, from which the centre of Carenero Chico cay bore N. by W. westerly; centre of Bomhome island E. by N. $\frac{1}{4}$ N., and Pascual cay north extreme E. by S. $\frac{1}{2}$ S. southerly. Depths of 5 and 7 fathoms, rock, were found close eastward of this shoal.

Clara bay lies immediately westward of Chico bight, between Lirio and Gorda points, which are half a mile apart. The former point is steep-to a cable off, and good anchorage will be found about half a mile to leeward of it, in from 8 to 10 fathoms water.

PORT SANTA BARBARA* may be described as an inlet running about a mile east and west, and a quarter of a mile in breadth. The north shore of the bay is formed of irregular hills, which rise a short distance from it to a considerable elevation. The head of the bay is low and swampy, and the south side is sheltered by a reef, several cays, and dry rocks, which extend a little more than a mile to the eastward from Escondido point.

From Paloma or Tropezon, about 70 feet high, with steep sides, the summit being covered with bushes, is the easternmost of these cays, a shallow ledge runs off $2\frac{1}{2}$ cables to the south-east, and its extreme end, from a depth of $4\frac{1}{4}$ fathoms, bears S.S.W. $\frac{1}{2}$ W. distant nearly 3 cables from Gorda point, leaving the entrance of the channel, between it and the point, less than a quarter of a mile wide. In the channel, northward of the east end of the cay, there are two small patches, with $4\frac{3}{4}$ fathoms water on them; and farther in, at its north-west end, a ledge extends nearly across the channel from the north side, a continuation of which bank extends across the channel off Great Carenero cay, on which the least water is 3 fathoms.

Off the north side of Great Carenero, 100 feet high and well wooded, the largest of the three cays on the south side of the bay, a reef with 3 fathoms on it runs off nearly $1\frac{1}{2}$ cables. A wooden pier about 40 feet long, with a depth of 18 feet at low water at the extremity, extends from the north side of the eastern part of this cay; the American mail packets lie alongside this pier when receiving coal, of which a limited quantity is stored on the cay.

Off Aguada bay, north of Carenero cay, there is good anchorage; $1\frac{1}{2}$ cables southward of the west point of this bay is the southern edge of the Gomère bank, a coral reef with 6 feet water on it, and deep water on either side; between it and the head of the bay is the inner anchorage, which carries a depth of from $3\frac{1}{2}$ to 5 fathoms, and is secure in all winds.

The town of **Sta. Barbara de Samaná** stands at the north-west end of the bay, at the base and on the sides of some small hills which are almost hidden from the eastward by a bold headland, on the summit of which there is a small fort and flagstaff. This town has increased in size of recent years. Forts Libre and Santa Barbara no longer exist.

Supplies.—Fresh meat, vegetables, fruit, and bread can be readily procured at moderate prices; the water obtained at Aguada bay is said to be unwholesome.

* In 1872 this place was ceded to an American company, who left it the following year.

Castillo point.—This point (on which fort Barbara formerly stood) is a steep bare cliff of reddish colour, about 40 feet high, with an old wooden house on the summit.

Mail communication.—An English mail steam vessel (in connexion with the Royal mail steam packets at St. Thomas) calls at Sta. Barbara de Samaná twice a month, and an American mail packet calls once a month.

Water.—There is a convenient watering place in Aguada bay, and another at a small stream a little to the westward of Cocoa point.

Directions.—Port of Santa Barbara or Samaná bay is so narrow that it can only be entered by a sailing vessel with the sea breeze, and left with the land wind; these changes are generally to be depended upon except in the winter months, when strong north-east winds blow continually for a considerable period.

Having rounded Balandra head keep along the land at the distance of about half a mile, after passing Cocoa point, close the island shore to avoid the Jean Bart reef, which having passed, keep Balandra head open of Cocoa point to clear the Chico reefs; then haul up for Gorda point, taking care not to bring this point to the eastward of North before the eastern hill of Carenero cay, which is 100 feet high, comes well open to the northward of Paloma cay about 70 feet high W.N.W., to avoid the ledge to the south-east of the latter. In the absence of a pilot the eye must be the guide, and if the sun is high, and astern of the vessel, the shoals may be seen from aloft.

Having passed Gorda point keep rather southward of mid-channel, which leads over the bar in the deepest water, when haul in towards Aguada to avoid the shoal off great Carenero cay; when the west end of that cay bears S.W. $\frac{1}{2}$ W. bear away to the westward, keeping the southern side again aboard to clear the Gomère bank, and anchor in $4\frac{1}{2}$ fathoms water mud, with Castillo point bearing N.N.E. $\frac{1}{2}$ E., and the west end of great Carenero cay S.E.

Leaving Port Santa Barbara or Samaná bay, should the sea breeze overtake the vessel before she is clear of the Levantados, be careful when to the eastward of them, and standing to the southward, not to bring the largest of Levantados cay to the northward of West until abreast Balandra head to avoid the Southern reefs. It may be here observed that the soundings everywhere are so irregular, and the tides so strong, that with the flood it may be found necessary to anchor under the west side of the Levantados, or under the northern shore, if the wind be to the northward of East, to wait for the ebb.

Tides.—It is high water, full and change, in Samaná bay at 9h. 30m.; and the rise is about 3 feet. The current frequently runs from $1\frac{1}{2}$ to 3 miles an hour, especially during the rainy season. It is therefore necessary to watch the current when leaving the harbour.

The coast* from cape Cabron trends W. by S. about 23 miles to Jackson point, 6 miles beyond which it turns almost suddenly to the northward for 25 miles to cape Francés Viejo. Between the two former points there are several small bays and beaches, whence, in favourable weather, mahogany is shipped in droghers, but there is no safe anchorage for large vessels. The western shore of this great bight is totally barren and uninhabited, and affords no shelter whatever.

Port Yaqueson or Jackson, somewhat sheltered by a cay and reef of the same name, is sufficiently large for moderate size vessels, with 10 to $3\frac{1}{2}$ fathoms water. Its entrance is open to the north-east, and said to be clear of danger, except a shoal which can easily be seen, and the extremities of the reefs which form the port. It will be known by some large cays or rocks at 4 miles eastward of the entrance, and further on in the same direction are other cays and reefs. Near the port and westward of it is the mouth of the grand Estero river, which formerly joined the Yuna river at the head of Samaná bay.

Cape Francés Viejo, or Old French cape, is bold, lofty, and visible 30 miles off. About 20 miles S.W. by S. of it there is a remarkable large mountain named Quita Espuela, which may be seen at the distance of 45 miles, and from off cape Cabron it has the appearance of a detached island. As it is approached, the land will be seen to slope gradually down to the cape. A very similar ridge branches off to the eastward, and when at a few miles from the shore its termination may be mistaken for the true cape; the extreme pitch of the true cape, however, is rather low, and there are some rocks and foul ground near it. A little to the westward of it, in a small bay, there is anchorage for small vessels.

Cape la Roca bears W. $\frac{1}{2}$ N. about 10 miles from cape Francés Viejo, and between them the coast is low, steep, and thickly wooded, and being foul, should not be approached within 3 miles. From cape Roca the shore extends about W.N.W. for 20 miles to Macoris point, which is high and steep-to. To the westward of the point is port Santiago.

Port Santiago is formed between the point of the same name on the east and that of Goleta on the west, and the entrance is about a mile in breadth. A dangerous reef extends from Goleta point to the south-

* See Admiralty chart, No. 393; scale, $m=0.06$ inch.

east in the direction of Cabarete point. To the northward of this reef is a bank of sand with $2\frac{1}{2}$ fathoms water on it, and also a rocky bank with $1\frac{1}{4}$ fathoms on it. The passage westward of these dangers between them and the inner reef is about 60 yards in breadth, and carries from $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water. Vessels of about 400 tons visit this port, and before going in, it will be well to buoy the outer reefs. A vessel may anchor in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water, at from one to 2 cables from the shore, but the holding ground is not good. The rise of tide at this port is $3\frac{1}{2}$ feet.

The coast between ports Santiago and Plata is bordered by reefs, and should not be approached nearer than 2 or 3 miles.

Port Plata* lies about 11 miles westward of port Santiago. Although confined in space, it is a place of some importance, with an increasing trade, and it is the port of entry for vessels trading on this part of the coast. The principal exports are logwood, coffee, and cocoa; the import dues are very heavy, the export comparatively light. The Spanish, United States, and German mail steamers call at port Plata. The harbour is a semicircular basin about half a mile in extent, with a low sandy shore. On its eastern point there is a small hill 65 feet high, and a fort, and to the southward of it is the town, which contains about 4,000 inhabitants. At about $2\frac{1}{2}$ miles inland, a remarkable flat-peaked mountain, called Isabella de Torres, rises to the height of 2,300 feet, and is an excellent guide for the port; it has a large white spot on it, and at 4 or 5 miles westward of it there are a few small sugar-loaf peaks. The channel is between the reefs outside, which skirt the shore at the distance of from a quarter to half a mile, and are steep-to.

The red buoy, formerly marking the eastern side of the entrance to this port, has been removed.

The engines and boilers of a steam vessel lie close inside the breakers on the north-east edge of the western reef at the entrance to the port.

A wooden pier extends from the shore, at about a third of a cable east of the old pier, to a little beyond Fort rock; there is a depth of 19 feet at low water at the head of this pier, alongside which the mail packets lie.

A red buoy (said to be moored with heavy anchors) is laid down about three-quarters of a cable S.W. from the outer extreme of this pier, and vessels lying alongside secure there sternfasts to this buoy.

The custom house is situated close to the old pier, and a large square church, with roof painted light red, is situated near the new pier.

Anchorage.—The holding ground in port Plata is good, but there is generally an uneasy swell; vessels have to moor at this anchorage.

* See Admiralty plan:—Port Plata, No. 472; scale, $m = 7.2$ inches.

LIGHT.—A revolving white light (every 20 seconds) is shown from an open iron structure situated 350 yards S.S.E. from extremity of east entrance point at the height of 137 feet above the sea, and should be visible 14 miles; the building is 60 feet high.

Water.—Two small streams empty themselves at the head of port Plata, and in the rainy season cause a strong outset; at this period the river St. Mark, in the western part of the harbour, is open for boats, and is the best watering place. In the dry season the eastern rivulet would be the most convenient; but the water casks must then be rolled up about a quarter of a mile and rafted off; at times the swell makes watering very difficult. Wood will be found on the western shore. Provisions are cheap and plentiful.

Winds.—In the winter at port Plata the sea breeze sets in strong from the E.N.E. about 9 a.m. and continues until near sunset, when a moderate land wind comes off from the southward. It is remarked that northers seldom blow home into the port.

Directions.—When at a distance of 2 miles from the coast, and running in for port Plata, bring the Fort point in line with the west end of the peak of Isabella de Torres bearing S. by W. $\frac{3}{4}$ W., and continue on this course until Owen rock, just outside the western reef, bears W.N.W.; then steer S.W. by S. $\frac{1}{4}$ S., which leads in through the channel, a little more than a cable wide, and for which the eye is the best guide. The soundings in the channel are regular, but just within the points it shoals very suddenly, and there are only 2 fathoms at a quarter of a mile from the head of the harbour; vessels of moderate draught must therefore be prepared to anchor immediately between the entrance points in about 5 fathoms water. Pilots may be had; the charge is 2*l*.

The reef skirts the coast for some miles to the westward of the port, but within a short distance of Patilla point the land may be approached to the distance of a mile, but there is no anchorage.

Tides.—It is high water, full and change, in port Plata at 7h. 30m., and the rise is about 3 feet; but there is no perceptible tidal stream. The current outside runs generally to the westward, inclining towards the shore.

Patilla point, 12 miles westward of port Plata, is a lofty bold headland, and readily distinguished; a reef runs off it for about 4 cables, and at three-quarters of a mile from the shore are 10 and 11 fathoms water. Thence the coast line trends about W. by N. 11 miles to cape Isabelle, the north extreme of San Domingo.

Cape Isabelle.—From off Patilla point, cape Isabelle has the appearance of a low, thickly-wooded island, with some remarkable palm trees on its north end; a small reef runs off about a cable from it. A short distance eastward of the cape is port Caballo,* a reef harbour, reported to be more commodious than port Plata; and near it again there is an anchorage called Azufre.

Isabelle Bay.—The shore from cape Isabelle turns to the south-west for 6 miles, and then to the westward; the head of this bay is celebrated as being the spot where Columbus established the first colony in the West Indies. Nothing, however, remains to point out the exact locality but the ruins of a single pillar, almost hid among the bushes near the beach. The bay is open to north and north-west winds, but good holding ground will be found in $4\frac{1}{2}$ fathoms water, mud and sand, with the north point bearing N.E. distant about $1\frac{1}{2}$ miles. Small vessels will find shelter farther in shore, with the north point bearing as far round as N.N.W., and the entrance to the river bearing S.E.; but the soundings are irregular, and there is a reef and some sunken rocks in the anchorage.

Water.—Good water may be obtained from the river in Isabelle bay, and wood and live stock in the neighbourhood.

Anchorage.—About 8 miles W. by S. from the head of Isabelle bay is Rucia point, close under which there is said to be anchorage in 12 fathoms water, sheltered by the reef off it as far round as N.N.W. About 3 miles farther west is a small cay named Arenas, which lies on the reef at about $1\frac{1}{2}$ miles from the shore. Under it there is also said to be anchorage in 5 or 6 fathoms; but all this part of the shore, as far as point Granja, is uninhabited, dangerous, little known, and had better be avoided.

There is anchorage in $4\frac{1}{2}$ fathoms eastward of Granja point between the point and the reef stretching W.N.W. from the eastern side of Jicaquito bay; the sea breaks at all times on the reef the end of which is N.N.E. about one mile from the eastern end of Granja hill. The eastern part of the anchorage is very shoal, and on entering it is necessary to keep over towards Granja hill.

Point Granja is a bold headland about a mile in length, and forms the extremity of the small peninsula of Monte Christi. It lies about W. $\frac{1}{2}$ S. 38 miles from cape Isabelle, and is readily distinguished by a remarkable hill near the shore, about 800 feet high. Its flattened summit has the appearance of a large barn, and, being seen long before the land in its neighbourhood, will be found a useful object to vessels beating up from the westward. To the eastward of point Granja the shore recedes to the

* Columbus visited this place in 1493, and gave it the name of Puerto de Gracia.

south-east, forming between it and Fragáta point a deep bight, called Jicaquito bay, nearly 2 miles broad, and $1\frac{1}{2}$ miles deep, which is reported to afford good anchorage, protected by a reef extending off from the latter point. The head of Jicaquito bay is low and swampy, and there is said to be a water communication between it and Monte Christi.*

Monte Christi Bank.†—From cape Isabelle an extensive bank of soundings runs off to the westward as far as 12 miles N.W. of point Granja, when it sweeps to the south-west, round the westernmost of the Seven islands, and connects itself to Manzanillo point southward of Monte Christi. This is one of the White grounds before alluded to in page 224, on which the water is discoloured. The depth is generally very uneven, and the nature of the bottom variable. On the edge it is chiefly coral and coarse sand, and about 2 miles within it, soft mud. On the meridian of point Granja the edge is nearly 8 miles distant; and as the shore is approached, irregular soundings of from 20 to 10 fathoms will be obtained.

Granja or Haut Fond banks, are two small patches near the edge of Monte Christi bank. The innermost, which bears N.N.E. $\frac{1}{2}$ E. about 6 miles from Granja point, is about a quarter of a mile in extent, and has as little as 23 feet water on it, with from 12 to 25 fathoms around. The other lies about a mile N.N.W. of this, close to the edge of the bank, and N. by E. $\frac{1}{2}$ E. $7\frac{1}{2}$ miles from Granja point. It is very similar in extent to the former, and has a depth of 6 fathoms. When on this patch the two small islets named Fraile and Cabra, near Granja point, will be open of each other clear of the point, and the westernmost islet bearing S.S.W. $\frac{1}{4}$ W.

Phaeton and Liverpool Shoals, upon which H.M.S. *Liverpool* grounded in June 1864, lie in a line N.W. $\frac{1}{2}$ N. from Fraile islet, which is 30 yards north-west of Granja point. Phaeton shoal is a little over 2 miles distant from Fraile islet, is $1\frac{1}{2}$ cables long east and west, and one cable broad, with a depth of $3\frac{1}{4}$ fathoms over it. Liverpool shoal, two-thirds of a mile N.W. $\frac{1}{2}$ N. from Phaeton shoal, is $3\frac{1}{2}$ cables long E.N.E. and W.S.W., one cable broad, and upon it there are from $2\frac{1}{2}$ to 4 fathoms. About half a cable north of the eastern end of Liverpool shoal is a smaller patch of 5 fathoms with 10 fathoms close to.

Granja point bearing E. by S. $\frac{1}{2}$ S. leads one mile southward of these dangers.

* Sir R. H. Schomburgk states, from information he had received, that there appears to be a canal, with a depth of from 2 to 4 fathoms, and a rise and fall of tide of 3 feet.

† See Admiralty plan :—Monte Christi and Manzanillo bays, plans of ports in San Domingo, No. 2,406; scale, $m = 0.75$ inch.

Monte Christi shoal lies West, about 9 miles from the Granja banks, with Granja point bearing S.E. $\frac{1}{2}$ E. 9 miles; and the western edge of the bank distant 3 miles. It is about three-quarters of a mile in length, north-east and south-west, and composed of detached small pointed rocks upon a white sand-bank, with as little as $2\frac{3}{4}$ fathoms on them, and from 4 to 7 fathoms between the heads. From the shoalest spot, the east end of a remarkable clump of trees will be seen open to the south-west of Monte Christi, and between it and the cay, bearing S.E., and the highest part of cape Haïti S.W. by W.

Fraile islet, about 30 yards from the extreme of Granja point, is an excellent landmark; there is no passage even for a boat between it and the point.

Cabra island, lying about 3 cables south-west of Granja point, is 33 feet high and partly covered with trees; there are low bluffs at its north and south ends, the middle is low, and it is scarcely distinguishable from the main land when approached from the westward, until close to. A reef extends one cable from the north end of the island.

Cay.—Nearly one mile S. by W. from Cabra island is a small rocky cay, northward of which is a bank divided into two parts by a narrow channel of $2\frac{3}{4}$ fathoms, which is buoyed, but the positions of the buoys in this anchorage are not to be depended upon.

Three-quarters of a mile westward of the anchorage is a small shoal with from $2\frac{1}{2}$ to 4 fathoms on it. From the shoalest part the middle of Cabra island bears N.E. by E., and the rocky cay S.E. by E. $\frac{1}{2}$ E.

MONTE CHRISTI ANCHORAGE.—From Granja point the coast takes first a southerly and then a south-westerly direction as far as Yuna point, about $5\frac{1}{2}$ miles S.W. of the above. In the bight is the anchorage and town of Monte Christi, which is overlooked by a remarkable hill crowned by fort Francisco, more than a mile from the shore, and at the extremity of the great mountain ridge which extends hence along the shore to capo Francés Viejo. When seen from the N.N.W., at about 5 miles distance, the summit of the hill has the appearance of a saddle with several white spots on its declivities. There is also a small fort on the shore to the westward of this, and two others between it and Granja point. The river Yaque formerly discharged itself a short distance to the south-west of the village, and supplied it with water, but it has changed its course within the present century, and now flows into Manzanillo bay, about 10 miles farther southward.*

* Sir R. H. Schomburgk.

There is good anchorage, protected from the trade wind and with smooth water, between Cabra island and the rocky cay lying S. by W. three-quarters of a mile from it; 5 fathoms will be found on a line between the island and the cay, eastward of which the water gradually shoals towards the shore and the bottom becomes soft; half a mile westward of this line there is a depth of 6 or 7 fathoms.

Directions.—If intending to pass northward of the Granja banks and the Monte Christi shoal, keep well to the northward to avoid the edge of the bank and to allow for the effect of current. When Granja point bears South a vessel will be westward of the Granja banks; and when Tereero cay bears South, the vessel will be westward of Monte Christi shoal. If bound to Monte Christi anchorage from the westward, close Granja point on an E. by S. $\frac{1}{2}$ S. bearing, to avoid the Liverpool and Phaeton shoals.

Bound to Monte Christi bay from the eastward, and intending to pass inshore of the Phaeton rock, round Granja point by the lead at a less distance than a mile or with Monte grande cay bearing W. by S. $\frac{1}{4}$ S. On the coast between cape Francés Viejo and Granja point, it is necessary always to make some allowance for the current which sets towards the land.

Currents and Tides.—Near the Seven islands and northward of them, the current sets to the south-east; therefore during light winds it is necessary to be cautious in approaching them from the north-west or west. The tides are perceptible in the vicinity of the islets and channels; the flood runs to the south-west, half a mile an hour, and the ebb north-east at the same rate.

The Seven islands form a group of small low cays lying on a shallow part of the bank to the westward of Granja point, occupying a space of about 8 miles east and west, and 5 miles north and south. The northern edge of the bank is about 4 miles to the southward of Monte Christi shoal, and a navigable channel a mile wide appears to exist between the cays and the shore. Tereero cay bears West, 9 miles from Granja point, and Arenas lies 4 miles farther to the S.W. The most of them are covered with mangroves, but Monte grande, the largest and the second from the eastward, is distinguished by trees larger than those on the others.

Manzanillo Bay* is at the head of the bight on the eastern shore southward of Monte Christi; and between Manzanillo point and the southern shore, it is 3 miles wide. The land on all sides of the bay is low

* See Admiralty plan :—Manzanillo bay, No. 471; scale, $m = 4$ inches.

and bounded by mangroves, and on the south-east and south sides the shore is steep-to, having 20 fathoms about half a mile from the beach. Foul ground extends for about three-quarters of a mile off Yuna point; a good berth should be given it, and to the coast as far south as Manzanillo point.

Anchorage.—There is no danger in Manzanillo bay; eastward of Congress point there is an excellent anchorage in 7 fathoms water, mud bottom, about half a mile from the shore.

Water.—The river Tapion empties itself into the east side of Manzanillo bay; the Terra-bassa into the south-east corner, and the Dajabon or Massacre into the south side. Good water will be found in either, but it will be necessary to proceed 6 miles up the latter, in the dry season, before it is fit for drinking.

The Dajabon is the present north-west boundary between Haïti and the Dominican republic.

Directions.—Manzanillo bay may be approached by the route outside Monte Christi shoal, and westward of the Seven islands, or by the channel through Monte Christi bay. In the former case a vessel from the eastward would go much to leeward and have to work to the anchorage. To take the inner channel after having passed Granja point, steer to the westward, and when Yuna point bears S. by W., steer towards it until Monte Chico bears West, when alter course to S.W. Pass eastward of Tororu, and when it bears N.N.E. haul to the southward, and work into the anchorage.

In this channel a vessel may anchor for the night; the depths are 6 and 7 fathoms, sandy mud bottom, and the holding ground good. The edge of the bank is very steep; from the depth of 11 to 18 fathoms it suddenly increases, the seaman should therefore be certain of being on the bank before letting go the anchor. In this bight the trade winds during the day and land winds at night are always sufficiently fresh to facilitate greatly the communication between port Fort-Dauphin and Monte Christi.

From the south-east corner of the bay the coast takes a westerly direction for 8 miles, continues low to the entrance of port Fort-Dauphin, and can be approached to the distance of half a mile.

Port Fort-Dauphin* (Delfin or Bahía) is a land-locked basin; the most secure in San Domingo, and has depth for vessels of the largest draught, with excellent holding ground. The channel into the port is about a mile long, but so narrow and tortuous that a sailing vessel will

* See Admiralty plan:—Port Fort-Dauphin, No. 470; scale, $m = 2.0$ inches.

find great difficulty in getting through it inwards, unless the wind is well to the northward of East, and she can only quit with a commanding land breeze. The entrance is not more than $1\frac{1}{2}$ cables wide, but it increases within to nearly half a mile. Both sides are fringed with a reef to a short distance, and the turnings are so sharp that there is scarcely time for a vessel to answer her helm.

Directions would be useless for entering this bay, as the eye can alone guide the vessel in mid-channel, which is all that is required. There is no room for working or weighing, should she be forced to anchor. The harbour is about 3 miles long, east and west, and a mile broad, and free from shoals except eastward of the town, which stands on the southern shore facing the entrance. Near the middle of the bay is Boyau islet, which is foul to the distance of a cable on its north-east side; the most convenient anchorage will be found in 12 fathoms water, between fort Dauphin, which is built at the north end of the town, and the islet. There is a good careening spot on the northern shore, a little eastward of the inner end of the channel.

About a mile westward of the entrance to the port commences the great reef, which sweeps outwards towards cape Haïti, and protects the east side of that harbour.

Tides.—It is high water, full and change, in port Fort-Dauphin at 7h. 0m.; springs rise $5\frac{1}{2}$ feet, neaps $3\frac{1}{2}$ feet.

Caracol bay lies between Yaquezi point, which is 9 miles westward of port Fort-Dauphin, and Caracol point, and is nearly 4 miles wide, but it is so shallow as to be only fit for coasters, which find their way into it either by the channel within the reef, or through a narrow intricate cut to the north-east of Caracol point.

About 6 miles westward of Caracol is a small bay, before which there is anchorage for coasters, with a deep cut in a north-west and south-east direction through the reef. Thence the shore still trends westward for 3 miles, and then turns suddenly to the northward along the eastern side of the great promontory of cape Haïti.

CAPE HAÏTI HARBOUR,* or Guarico, is protected on the east by sand-banks, or White grounds, and extensive reefs, on which the sea generally breaks, leaving it open only to the north; but in this direction the anchorage is well sheltered by a shoal in the centre and outer part of the harbour. The southern shore is low and swampy, and bounded by a sandy beach. At the east end of the beach stands the small village of Petite anse, and about midway between the village and the western shore

* See Admiralty plan :—Cape Haïti harbour, No 1,714; scale, $m = 4\cdot4$ inches.

there is a small woody hillock, on which is the ruin of a fort. The river Haut du Cap empties itself into the south-west corner of the harbour, but the water is not sufficiently good for drinking until 2 or 3 miles within the entrance.

Buoys.—The buoys in this harbour are not to be depended upon neither in position or distinctive character.

The town also stands at this end of the harbour on a small plain three-quarters of a mile in extent, at the base of the lofty irregular range called Haut du Cap, which rises abruptly from the shore at Picolet point, (the north-east extreme of the promontory of cape Haïti,) and about a mile westward of the town it reaches the height of 2,324 feet. The population does not exceed 9,000. Haïti is a port of call for several lines of steamers from Europe and from the United States. The chief exports are coffee and logwood. The American coal dépôt formerly existing in this harbour has been removed.

About $1\frac{1}{2}$ cables north-west of Picolet point, and close to the shore, there is a remarkable small barren reddish-coloured rock, streaked with yellow, and much washed away at the base, which may be recognized at the distance of about 3 miles, and a fort with white walls stands on the extremity of the point about 50 or 60 feet above the sea. Half a mile to the southward of the point is fort Joseph, which is overlooked by a hill 963 feet high, detached from the main ridge, and crowned by the look-out house with its roof painted red and white and 3 signal posts; a quarter of a mile within fort Joseph there is another small battery, and half a mile farther in at the north end of the town are two forts at the water's edge, which command the anchorage. Between these two latter forts was the ruined tower d'Estaing, where a landing-place has now been built.

The land wind blows all night, and after an interval of calm is succeeded at 10 or 11 a.m. by that from N.E. or E.N.E. Invariably off the coast the winds are from S.E. or East, and at 10 or 11 a.m. they veer to the N.E. or North. Those from the north cause much sea in the harbour.

Water.—Near the end of the innermost fort is the watering jetty, where casks may be filled in the boat; in the dry season, however, water is sometimes scarce, and it must be sought in the river. The reservoir also supplies the town, and consequently during the daytime it runs very slowly, but after 10 p.m. several boats may be filled rapidly at a time; it is necessary, however, to obtain permission of the Governor before the usual time of turning the water off.

The eastern reef generally breaks heavily, its western edge is marked at the entrance by a *red* buoy with staff and flag, but there is a detached patch with $3\frac{1}{4}$ fathoms water about 3 cables N.N.W. of the buoy, and which should be avoided.

Le Grand-Mouton, the shoal which shelters the anchorage in the harbour from the north and obstructs the passage in, is 4 cables long in a north and south direction and 2 cables broad. Its north end, on which the sea generally breaks, lies E. by S. about a quarter of a mile from fort St. Joseph, with a clear deep channel between, but being so far to leeward, although the most direct passage, is seldom used by sailing vessels; there is a *red* buoy at the outer edge of the spit that stretches to the south-east of point aux Dames. At about a cable eastward of the south end of le grand-Mouton there is a small detached shallow head, steep-to, on the east extreme of which is a *red* buoy in 5 fathoms.

Le Petit-Mouton, which generally shows itself, lies S.E. by E. $2\frac{1}{2}$ cables from grand Mouton buoy, and near the edge of the eastern reefs.

La Trompeuse is a small shoal with 3 feet water on it, lying in an awkward position near the middle of the bay, South nearly half a mile from the above buoy, it has a red spherical buoy on its North side in $5\frac{1}{2}$ fathoms.

Directions.—Approaching Cape Haïti harbour from the westward, give the shore a berth of a mile at least until Picolet point bears South in order to avoid some coral banks, on which there are from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms water, and probably less, which cause a heavy roll of the sea. If coming from the eastward, and having passed Monte Christi shoal, keep a westerly course until the highest part of the Haut du Cap range bears S.W., when steer towards it; having sighted fort Picolet, bring it to bear S.S.W., and stand for it, when cape Haiti, the extreme north point of the promontory, bears West, the vessel will be abreast the north end of the eastern reefs, and may then haul up under their lee, observing that the channel between the reef and point Picolet is only 4 cables wide.

In standing towards Picolet point, three remarkable peaked hills of considerable elevation, and near each other, will be seen at a good distance inland, to the southward of the Haut du Cap, and a little open to the eastward of it; and on one of them, called the Bishop's cap, the extensive ruins of a large castle and citadel. This hill open westward of the small woody hillock, before mentioned, near the beach at the bottom of the bay, bearing S. $\frac{3}{4}$ W., leads in close to leeward of the reef. Approaching grand Mouton be careful not to shut in the barren rock, which lies north-west of Picolet point, with that point, until the vessel is abreast of the north end of the bank, or the Look-out comes in one with fort Joseph bearing West, when keep away with the buoy off the south-east end of the Mouton on the starboard bow.

Having passed eastward of this buoy, steer towards the custom house, with that building in line with the Masonic hall (the highest and most

conspicuous building in the town ; its eastern gable has a portico and is painted gray), and when point Picolet bears N. by W., haul up for the anchorage, passing inshore of la Trompeuse shoal. As a vessel may have to haul up as high as S.E., she must wait until the sea breeze has set well in, and strangers had better not attempt to enter without a pilot, who is generally at hand. A sailing vessel will have to wait for the land wind to carry her out ; and as the sea breeze in the winter months sometimes prevails during the night, she may be liable to some detention.

The clearing marks formerly used are not now readily recognised by a stranger. The following will be useful.

When entering this harbour Barren rock should be kept just open of Picolet point until the cathedral bears S.W. by W. $\frac{3}{4}$ W., when it must be steered for on that bearing. When Picolet point bears N. by W. $\frac{1}{4}$ W., la Trompeuse shoal will have been passed, and anchorage may be taken up as convenient.

Cathedral.—The new cathedral, erected in the centre of the town among the ruins of the old cathedral, is a large conspicuous square building of a yellow colour with a sloping dark roof.

The square tower, and some other portions of the old cathedral, are still standing.

Pier.—A wooden pier, about a quarter of a mile long, extends in a S.E. by E. $\frac{1}{2}$ E. direction from close east of the custom house (recognised by a house painted red standing next south of it) ; there is a depth of 21 feet at low-water springs at the outer extreme of this pier.

Tides.—It is high water, full and change, in cape Haïti harbour at 6h. Om. ; the rise is about 3 feet.

Port François, 5 miles westward of Picolet point, is a small bay open to the northward ; there is, however, excellent anchorage, with the prevailing winds, in the south-east part of the bay, about 2 cables S.S.E. of St. Honoré point, in from 8 to 10 fathoms water, clay and sand, with the fort bearing E.S.E. St. Honoré point forms the east side of the entrance, and be careful to avoid a reef which extends a cable from it to the north-west.

From St. Honoré point the shore recedes to the southward and westward, forming a deep bight, as far as Marigot point, 9 miles westward. The front is skirted by an impassable mass of reefs and cays, upon a White ground, which commences at the south end of port François, and takes a westerly direction for 5 miles to Philippot, the largest of the cays, when it becomes broken, and leaves small openings leading into Acul harbour.

ACUL HARBOUR* is a well-sheltered inlet, 4 miles in length north and south, and about half a mile in breadth. It has sufficient depth for vessels of the largest draught, and its shores are in some parts so bold as to afford safe places for careening. The entrance channels, however, through the reef are so narrow that they are not easily accessible to large sailing vessels, and if the islets and shoals are not clearly visible, they should not be attempted. It is difficult to make out the entrance from the offing, there being no buildings or conspicuous objects to mark it.

There are three channels by which a vessel can enter this harbour. The eastern, between Arena cay on the east, at the extremity of the reefs bordering the coast from port Français, and Rat islet on the west, is only a cable wide. The former cay, small, low, and sandy, lies about $1\frac{1}{2}$ miles to the north-east of the entrance of the harbour, and the same distance to the eastward of Philippot cay. Rat island is small, low, wooded, and lies about a mile to the W.S.W. of Arena cay, and little more than a quarter of a mile from the south-east end of Philippot cay.

Water is difficult to obtain in Acul harbour; the best place is at a small stream south-east of Marias point.

Directions.—Approaching the eastern channel, be careful to keep an offing of at least 3 miles, until Rat islet bears S. by W. $\frac{1}{2}$ W., and at this distance Marias point, the east side of the entrance, will be easily recognised, and on nearing it a low point within on the west side, in the interior of the bay, named Bélic point, on which there is a remarkable clump of trees. These two points in one, with slight deviation so as to preserve the depth of 9 or 10 fathoms, will lead nearly in mid-channel; on either side there are white sand-banks, with 4 fathoms on their edge. It is necessary that the leading marks should be clearly made out when well outside. After passing Rat islet the channel opens out, all the dangers are visible, and there is good temporary anchorage in 13 to 16 fathoms water, outside the entrance to the harbour.

If intending to enter the inlet, give Marias point a berth of at least 3 cables, to avoid a bank, on which there is very little water, and having near its west end a small islet named Bayou. Thence shape the course in mid channel, taking care to avoid the patch with $2\frac{1}{2}$ fathoms water on it, S. by E. 5 cables from Marias point. Having passed this, the vessel will be within the outer basin, and may anchor under the eastern shore in 9 fathoms. To enter the inner basin, she must haul up, and pass Moro Roxo (Red hill) point at the distance of half a cable to clear a shoal which extends off from Bélic point, and having rounded that bluff, haul into the small cove called Lombardo or Carénage, and anchor in $6\frac{1}{2}$ fathoms water

* See Admiralty plan :—Acul harbour, No. 468; scale, $m = 1\cdot3$ inches. Also charts No. 393, scale, $m = 0\cdot06$ inch; and No. 486, scale, $m = 0\cdot08$ inch.

a cable from the shore. The inner end of the inlet is so studded with shoals that it would not be prudent to advance farther in without the assistance of a pilot.

Middle channel.—To take this passage into Acul harbour it is necessary that the wind should be well to the northward, as the vessel will have to lie up S.E., and there is no room to work. Keep without the White ground until Rat islet bears S. by E. $\frac{1}{4}$ E. Haul in on this course, which will lead to the eastward of the reef which runs off from Philippot cay, and about a cable to the south-west of some reefs, easily seen, which lie about $1\frac{1}{2}$ miles to the northward of Rat islet, then haul up to the south-east in order to weather the reef which extends off to the eastward of this islet, and having passed it shape the course for the outer anchorage, or entrance to the harbour. The only advantage in this channel is that all the reefs are seen, but be prepared to anchor in a moment should the wind die away within the reefs; the ground is hard mud, good for holding and sheltered from the sea breeze.

Limbé or Western channel takes its name from a small round islet close to the east side of Marigot point, which forms the west side of the entrance, the east side being bounded by Veille cay. This is the largest and best channel, as there is room to work in it. When approaching this channel it is also necessary to keep well outside the banks, until Yeague point bears South; this point is between that of Limbé and Gran Boucaud, which is the western side of the entrance; that of Limbé is the northern and western, and the islet is near it; then haul up S.S.E. $\frac{1}{2}$ E. or towards Yeague point, which being a steep, bold, rocky bluff, and the only elevated spot to the south-east of the morro Marigot, may be readily distinguished.

As Yeague point is approached, the sea will be seen breaking on a large reef to the eastward, on which is Veille cay, with $4\frac{1}{2}$ fathoms water near it; then steer midway between it and the point in from 9 to 14 fathoms water, so as to pass 3 or 4 cables from Gran Boucaud point, and anchor westward of Marias point. If necessary to work in, the reefs on which the sea breaks may be approached to a prudent distance, and the coast to 2 cables. There are other reefs to the south-west of Rat islet, having narrow channels between them.

Limbé islet.—The small islet of Limbé lies eastward of the point of the same name and mount Marigot. To the southward of it there is anchorage sheltered on the north by the islet and by the reef called the Peña Pobre which extends eastward from Limbé point. But this anchorage in front of the town of Limbé is open to the eastward, and only fit for coasters, which moor between the coast reef and that surrounding the island in about one fathom water.

Chouchou bay.*—Marigot point is next westward of mount Marigot, and off it is a small round islet, which becomes a useful object in this neighbourhood.

Chouchou bay is about 3 miles westward of Marigot point. In this bay there is good anchorage in $5\frac{1}{2}$ or $6\frac{1}{2}$ fathoms water. Entering the bay, round the eastern point close-to in 5 fathoms and shoot the vessel into a berth, for she will lose the wind within it, even should it blow hard outside. A short distance westward, and separated from it by Baril du Bœuf point, is the small bay of Salt river, in which there is shelter for coasters.

Fond-la-Grange† is the name of a bay, about half a mile wide and the same deep, lying 4 miles westward of Chouchou. Palmiste, its western point, is known by a chain of dangerous reefs which extend westward $1\frac{1}{2}$ miles from the shore, almost as far as cape Rouge, distant miles. There is good anchorage here, and shelter for vessels of the largest draught. The shore is steep, and nearly 2 cables off it the depth is $5\frac{1}{2}$ fathoms. The east point is bold and steep-to, and having rounded it, anchor as most convenient in the middle of the bay in $6\frac{1}{2}$ fathoms water, muddy sand.

Immediately westward of Fond-la-Grange is a bay and the mouth of the Borgne, which affords anchorage for small vessels in 2 to $4\frac{1}{2}$ fathoms water, under shelter of Palmiste point, but open to the north.

The coast‡ from Chouchou takes a N.W. by W. direction for about 18 miles, where it terminates at Carenero point, the north extreme of this part of the island, and the east point of port Paix, and is very apt to be taken for cape Rouge, which is 8 miles from it. From the small bay of Borgne, to cape Rouge, about 3 miles westward, the coast is formed of cliffs, and bordered by reefs which are covered and extend off $1\frac{1}{2}$ miles. Between is the little bay of Lavaud, fit for small vessels, and a river runs into it.

Eastward of cape Rouge is a shallow bay, fit only for small vessels, and where the river Bas-de-Sainte Anne empties itself.

The other anchorages suitable only for small vessels, between cape Rouge and Grande point are, the bay and river of cape Rouge, where there are $1\frac{1}{4}$ to $2\frac{3}{4}$ fathoms water, and well sheltered by the reefs; the bay of Gran and the Pequeño Marigot with $2\frac{1}{4}$ to $3\frac{1}{4}$ fathoms water, and the bay of the petite Rivière. These last anchorages are sheltered on the north by the island of Tortuga, but little to the eastward.

* See Admiralty plan :—Chouchou and Salt river bays, scale, $m = 5$ inches, in plans of ports, San Domingo, No. 2,406.

† See Admiralty plan :—Fond-la-Grange bay, scale, $m = 5\cdot3$ inches, in plans of ports, San Domingo, No. 2,406.

‡ See Admiralty chart :—West Indies, Sheet IV., No. 486; scale, $m = 0\cdot08$ inch.

Port Paix* is merely a small bay, not more than half a mile wide, and scarcely a quarter of a mile deep; it affords, however, well sheltered anchorage, being protected on the north by Tortuga island, and is only open from north-west to west. The town stands on the eastern shore, and is commanded by two small forts. The land behind is lofty, with a small, but remarkable, sugar-loaf hummock, sloping to the westward. From Pèrez point, on which stands the battery to the north of the village, the shore is skirted by a reef, said by French and Spanish authorities to the distance of three cables, with 12 fathoms on its edge, but this would nearly block the bay up; by the plan it runs off only about a cable. Entering port Paix (which should be done under easy sail) bring the village to bear S.E., and keep in mid-channel between the forts, anchoring directly the depth is less than 20 fathoms; this will be just within the line of the forts at about 2 cables from the village. The holding ground is excellent, and the vessel will shoot into about 12 fathoms, mud and sand. Small vessels, anchoring further in, must be careful to avoid a small rock which lies about half a cable from the shore, in front of the town.

TORTUGA ISLAND.

This island is 22 miles long, in a W.N.W. and E.S.E. direction, and 6 miles broad; the centre is moderately elevated, but its extremes are low. The north side is formed of perpendicular inaccessible cliffs, steep-to; the greater part of the southern shore is skirted by shallow white grounds and reefs, which within them in some places afford shelter to coasters.

Tierra Baja road† is the only good anchorage on the south side of the island, and lies 6 miles from the east end; it is, however, only fit for vessels of 14 or 16 feet draught, as the bottom is very irregular, and varies in depth from 3 to 6 fathoms. There is also said to be anchorage under the west end of the island.

About 6 miles westward of the road is a red cliff close to the shore, which can be seen for some distance from aloft; and on the summit of the mountain will be seen the only clearance in the vicinity.

To enter Tierra Baja road, bring the upper hut, which is whitewashed, in one with a scraggy tree below it, N.W. $\frac{1}{2}$ N., which, with the assistance of the eye, will lead through the narrow cuts in the reefs that will be seen breaking on either side. The best berth will be found on the

* See Admiralty plan :—Port Paix, scale, $m = 5$ inches, in plans of ports, San Domingo, No. 2,406.

† See Admiralty plan :—Tierra Baja road, scale, $m = 2.8$ inches, in plans of ports, San Domingo, No. 2,406.

above mark, in about 6 fathoms, sandy bottom. The tide rises about 3 feet. Large vessels may anchor on the White ground outside the reefs about a mile to leeward of the town.

Tortuga Channel.—East point bears N.E. $\frac{1}{2}$ N. 9 miles from cape Rouge, but between Carenero point and the south side of Tortuga the channel is little more than 4 miles across, when it again opens out to the westward to about the same breadth as above. In the daytime vessels may beat through without fear as the reefs are distinctly seen, but it would be dangerous to attempt it in the night. If bound to windward they may obtain great advantage by taking this channel: for there is a strong easterly set, which is seldom checked except by a southerly wind, which does not often occur. In doing this, however, they must not approach either shore within a mile, in order to avoid the eddy stream. Should the current be found setting to the westward, it will be better to keep well to the northward, and not approach Tortuga within 18 or 21 miles.

In 1883 H.M.S. *Fantome* obtained soundings in 11 and 14 fathoms, with port Paix lights bearing S. $\frac{3}{4}$ E. in the middle of Tortuga channel. H.M.S. *Flamingo* in 1884 reports that the configuration of the South and S.W. coast line of Tortuga is wrongly shown upon our charts.

Moustique bay* lies W.S.W. 10 miles from port Paix, and the shore between is bold, scarped, and steep-to. It is about 4 cables across at its entrance, and about the same deep, the bottom irregular and rocky, and between the points at the entrance there are 28 fathoms water. On the west side of the bay there is a small islet, and about three-quarters of a cable to the south-east of the islet there is a rock under water. The best anchorage will be found nearly abreast this rock, in the middle of the bay, in about 20 fathoms, but be certain of soundings before anchoring.

Port à l'Ecu† is $4\frac{1}{2}$ miles westward of Moustique bay, and the shore between is lofty and very steep. This is a better anchorage than Moustique, but the entrance is much narrower on account of a reef which skirts the east side, and extends $1\frac{1}{2}$ cables from the point, with 7 fathoms on its edge and 2 fathoms within. This port is sheltered from North round by East to N.W., and it is difficult to enter with the usual winds unless they are well to the northward. Entering port à l'Ecu, it will be necessary to give the above point a wide berth, and then haul into the bay, and anchor with a remarkable house on the southern shore bearing S.S.W.

* See Admiralty plan :—Moustique bay, scale, $m = 5.5$ inches, in plans of ports, San Domingo, No. 2,406.

† See Admiralty plan :—Port à l'Ecu, scale, $m = 5.5$ inches, in plans of ports, San Domingo, No. 2,406.

in $7\frac{1}{2}$ fathoms water, sandy bottom. On the west side the bottom is mud, good holding ground.

It is high water, full and change, in port à l'Ecu at 6h. 0m.; springs rise 3 feet.

Juan Rabel bay,* about 8 miles westward of port à l'Ecu, affords anchorage, and is easy of access. Juan Rabel point is low and bushy, and stands prominently out to the northward; the shore in the neighbourhood is diversified by bold rocky cliffs and sandy beaches, and the interior becomes mountainous, and broken into distinct ridges. A remarkable peak, resembling the ruins of a castle, bears S.W. $\frac{1}{2}$ W. from the bay, about 2 miles inland. About a mile southward of Juan Rabel point there is a small village, and near it a river; and to the left of the village a high white cliff and long sandy beach. The east side is skirted by a reef, steep-to, and may be approached without fear; the depth is 8 fathoms close to the edge. Vessels of large draught had better anchor N.N.W. of the village distant half a mile, and about 2 cables from the reef, in from 10 to 13 fathoms water. It will be better not to shut in the two points on the east side, as within that line the soundings decrease suddenly, and the bottom becomes foul.

The coast from Juan Rabel point trends to the W.S.W. for 12 miles to cape Nicola Mole, and is composed of low rocky cliffs steep-to. It affords no shelter, and has received the name of the Iron coast.

The current in the offing, about 6 miles from the shore, at times takes a north-east direction, but the set is in general westerly, and within that distance it inclines towards the land, increasing in strength. In proportion as the channel between Cuba and San Domingo is approached it also increases in strength, inclining to the south-west.

St. Nicolas Mole† is an inlet formed by a flat peninsula, connected to the main by a narrow low isthmus. From the appearance of this table land at a distance, it is called the Mole. The outer bay is on the south side of the peninsula, between capes Nicola Mole and St. Nicolas, and is $1\frac{1}{2}$ miles broad; thence to the town, on the south side of the bay, at the entrance to the carénage, the distance is $2\frac{1}{4}$ miles. In this outer part the depth is too great for anchorage.

From the sandy point on which the town is situated, the bay is half a mile across; thence the shores on either side turn rather suddenly to the N.N.E. for $1\frac{3}{4}$ miles, narrowing at the inner part to about 2 cables, forming the inner port or carénage. Here vessels of the largest draught may lie

* See Admiralty plan:—Juan Rabel bay, scale, $m = 3.2$ inches, in plans of ports, San Domingo, No. 2,406.

† See Admiralty plan:—The Mole of St. Nicholas, No. 467; scale, $m = 3.0$ inches.

up with the greatest ease and safety; it is, however, close and confined, and would probably be unhealthy.

Water.—The watering place is at a little stream which runs through the town; here the beach is steep-to, so that casks may be filled in a large boat with great ease and rapidity without landing them; it will be better, however, to water in the night, for in the daytime the stream is occupied by washerwomen. Fresh stock is procured from the interior.

Directions.—A vessel will have to work into St. Nicolas bay, but although the shores are steep-to, it will be advisable not to approach the south side too closely, as the sea breeze generally blows strong from N.E. in variable gusts, and she might miss stays. The most convenient anchorage will be found in from 7 to 10 fathoms water, at about 2 cables from the northern shore, with fort St. George, which stands in front of the town, bearing S.S.E., and the magazine to the north-east of the town E. $\frac{1}{2}$ S. The soundings are extremely irregular and foul, and a vessel will not be on the bank until fort St. George bears S.E. by E.; a conspicuous church stands a little southward of fort St. George.

Shoal.—A shoal with four fathoms on the outer edge and decreasing to the shore, extends about 300 yards to the westward from the south-west end of fort St. George.

Wishing to proceed farther in, do so without fear, but keep the town shore aboard, and a good berth will be found with fort St. George bearing S.W., and a guard-house close to the east side of the town S. $\frac{1}{2}$ E. If intending to enter the carénage, it will be better to wait until the sea breeze lulls, and then warp or tow in; in the winter this will not take place until towards 8 p.m. The land wind generally comes off from S.E., and blows moderately until about 6 a.m., when [there is a calm for about two hours before the trade wind sets in. If bound out to the northward and eastward, it will be better to weigh with the last of the sea breeze.

Cape Fou bears S.W. $4\frac{1}{2}$ miles from cape St. Nicolas, and near its extremity lies a small rock resembling an islet. A short distance to the southward there is also a remarkable white cliff, called the Upper white horses. Between cape Fou and Pearl point the features of the shore are bold perpendicular cliffs steep-to. The interior rises abruptly into a ridge of mountains, 2,000 feet high, only 3 miles from the shore, under which vessels are frequently delayed by calms. The current sets strong round the point to the northward, but 6 miles in the offing it will generally be found running to West and W.S.W.

From Pearl point the shore sweeps round to the south-east for 10 miles, and terminates at a remarkable white rocky bluff with a flat mound on its

summit, called the Platform; about 3 miles N.W. of it there is another similar cliff called the Lower white horses.

Vessels finding the northerly winds too strong on opening Pearl point, should seek shelter under the platform, either anchoring or remaining under way.

Anchorage will be found in $8\frac{1}{2}$ fathoms water close to the shore westward of Pearl point, in a sandy bay, where there is a small village, with the entrance to a small rivulet bearing N.N.E., and the southernmost point E. by S. The bank does not extend more than 2 cables from the shore, and is so steep that the first cast will be 10 fathoms; but a vessel had better shoot into the depth above, as the edge is foul. In the rainy season it is a good watering place. To the westward of the Platform is the little bay and village of the same name, where there is anchorage in $2\frac{1}{2}$ to $3\frac{3}{4}$ fathoms water; a rivulet runs into the middle of the bay.

Henne bay.—From the Platform the shore takes an easterly direction for 7 miles, to a remarkable white cliff at the base of the high land; thence it trends N.E. by E. for 2 miles to Henne bay, on the west side of which a lofty mountain rises from the shore to the height of 1,700 feet. There is anchorage here, but it is not recommended.

From Henne bay the coast runs S.E. by E. nearly 2 miles, and then E. $\frac{1}{2}$ S. for $3\frac{1}{2}$ miles to Paradis point, on the east side of which there is a small bay open to the south-east.

Port Piment.—The shore from Paradis point takes a slight curve inwards until near a remarkable mound on the low savanna land, at the back of the small bay called port Piment, which lies E. $\frac{1}{4}$ S. $7\frac{1}{2}$ miles from Paradis point. There is also anchorage here in a case of necessity, and the shore is bold and steep to all the way from the Platform.

Corridon point.—From port Piment the shore trends S.E. by E. $\frac{1}{2}$ E. for 7 miles, to a prominent bluff rocky point called Corridon, whence to Pierre head its direction is S.E. $\frac{3}{4}$ E. and the distance 10 miles.

Anchorage.—There is an extensive bank of soundings off the bend of the coast between these two points, on which a vessel may anchor in 17 fathoms water, clean ground, with Corridon point bearing N.W. $\frac{1}{4}$ N., and Pierre head East.

Pierre head is a lofty rocky headland, overlooked by a mountain of the same name. At a third of a mile S.S.W. $\frac{3}{4}$ W. from it, there is a bank with a depth of 2 fathoms; and nearly a mile S. $\frac{3}{4}$ W. from the point, there is another with $3\frac{1}{4}$ fathoms on it. They are of small extent, and between them the soundings are 14 and 15 fathoms. A grove of trees, called Bayahondes, standing eastward of the town of Gonaïves, in one with point Blanca de Gonaïves, bearing East, will lead between them; and

when Pierre head bears North, steer E.S.E. to round the reefs which extend $1\frac{1}{2}$ cables from point Verde de Gonaïves, the north point of the bay.

Winds.—On the west coast of San Domingo the sea breeze, in settled weather, generally sets in from the westward at about 11 a.m., and continues until 7 p.m. The land wind comes off from S.E., and in the rainy season it frequently rushes down from the high lands with the violence of a tornado, with little or no warning, and everything must be in readiness to shorten all sail in an instant. These gusts generally extend to the distance of 6 or 9 miles from the shore; sometimes, however, in the hurricane months they will reach the middle of the channel between San Domingo, Cuba, and Jamaica.

Gonaïves bay,* although open to the westward, is a safe and good anchorage, especially for vessels of light draught, which can proceed into Hospital bay, where they will lie landlocked in $3\frac{1}{2}$ fathoms water. The entrance, between Verreur point on the south and the nearest part of the northern shore, is nearly a mile across, and the only danger of importance is a shallow ledge, which extends northward about 2 cables from Verreur point, and which can be avoided by the eye in clear weather.

Verreur point is low and covered with bushes which extend to the water's edge (the fort formerly situated on this point no longer exists); it is the north end of a small low peninsula (or rather island, for it is separated from the main by a channel for canoes at high water), which forms the west side of the inner harbour. The entrance is difficult to be made out from the offing, especially at the first time of approaching it. It should be borne in mind that the land north of the bay is high, whilst that on the south is a low level plain extending as far as the river Artibonde, a distance of 14 miles. The town, containing a population of about 7,000 inhabitants, stands on the eastern shore, in front of the entrance, and is protected by fort Castries, standing on the summit of a small hill of moderate elevation, on the north side of the bay. When seen from the offing, the mountains at the back of the town present a burnt brownish appearance.

Directions.—Entering Gonaïves bay with the sea breeze, a vessel may pass either to the northward or southward of the shoals off Pierre head. In the latter case, which will be the best, bring fort Castries (fort Castries, although painted white, is difficult of recognition, as it is surrounded with trees; the low hill on which it stands appears white at the base) in line with a remarkable vertical notch† or cut in a mountain,

* See Admiralty plan:—Gonaïves bay, No. 466; scale, $m = 1.9$ inches.

† In 1881, H.M.S. *Druid* failed to see this notch or cut.

called Biénac, to the northward of the town, bearing E.N.E. This mark will lead close to the southward of the shoals, and to within about half a mile of Blanca point ; from thence steer in mid-channel towards the town. The soundings are very regular, decreasing gradually as the shore is approached, and the anchorage may be chosen according to the vessel's draught. The best berth for vessels of large draught will be found in 7 fathoms water, mud, sand, coral, and weeds, with fort Castries bearing North, and the centre of the town E. by N. Small vessels may go so far in as to bring the fort N.N.W.

After passing little Boucan point (point Verde de Gonaïves), which is low, on the north side of the harbour, and a mile eastward of Pierre head (which should not be approached too close as a shoal extends $1\frac{1}{2}$ cables off it), Castries fort will be seen and the land begins to rise and form into cliffs with several white marks, which will assist in knowing point Blanca.

A vessel working into Gonaïves bay should not stand farther to the southward than to keep the rocky shoulder of mount Biénac on with the northern slope of mount Chatenay N.E. $\frac{1}{2}$ E. In leaving the bay keep the above mark on until St. Mark point opens out 2 or 3 degrees westward of Devils point, in order to avoid the reef which skirts the shore nearly as far as the latter point ; Devils table from this position will appear as an island. The bay is generally entered with the sea breeze, but in leaving it is better to wait for the land wind.

The sea breeze sets in from the north-west towards noon, and continues until 10 p.m., when it is succeeded by the land wind, which blows off about E. by S. until 6 a.m. At Artibonde the land wind lasts until 8 a.m.

Tides.—It is high water, full and change, in Gonaïves bay at 8h. 0m., and the rise is about a foot.

The coast from Verreur point takes a southerly direction, and continues very low to within a mile of Devils point, when it becomes a little elevated, and forms a flat wooded table-land, called the Devils table. The extremity is a steep rocky cliff, about 50 feet high. The sand-bank with from one-half to 2 fathoms water on it, which projects 2 cables northward from Verreur point, skirts the western shore of the peninsula or island, at the distance of half a mile, and thence southward as far as Halle point, the south extreme of Tortue bay, where it extends off more than a mile.

At $1\frac{1}{2}$ miles N. by W. $\frac{1}{4}$ W. from Halle point there are two or three dangerous heads of coral, with $1\frac{3}{4}$ to $2\frac{3}{4}$ fathoms water on them ; these heads are off Tortue bay on the edge of the bank, and near them are

10 and 12 fathoms water; west of the point also shoal water extends for $1\frac{1}{2}$ miles, the shore therefore as far south as Devils point should be approached with caution. In case of necessity, temporary anchorage can be had in 3 or $3\frac{3}{4}$ fathoms water, near the shore in Grand Pierre bay. At the bottom of the little bay, north of the cliff of Devils point, is the river Artibonde, the entrance to which is nearly dry at low water; at high tide boats may proceed 5 or 6 miles up, and obtain a good supply of water, but there is no wood at hand.

Artibonde river.*—When passing Devils point, the water was observed to be discoloured at a distance of about 2 miles seaward of the entrance to Artibonde river, but on sounding at $1\frac{1}{2}$ miles S.E. of Devils point, no bottom was found at a depth of 85 fathoms. During the rainy season a small steam vessel, drawing 4 feet water, plies on Artibonde river for logwood.

Directions.—To anchor off Artibonde river, having brought Devils point to bear South, distant about 3 miles, a few small houses will be seen near the shore; bring them on an E.S.E. bearing, and when within about 2 miles of them the vessel will come upon a detached bank, upon which she may anchor in from 20 to 6 fathoms water. The lead, however, must be well attended, for the bank is very steep, within that distance there is deep water, until about half a mile from the shore, when it suddenly shoals to 5 fathoms. On the south side of the entrance to the river there is a remarkable small cavern, but this place is seldom visited.

St. Mark bay.†—From Devils point the shore takes a south-east direction for about 7 miles, and then turns somewhat suddenly to the south-west for the same distance to St. Mark point, forming the bay of that name, at the head of which is the town (containing 5,000 inhabitants) and anchorage. St. Mark point is a broad round headland, about 3 miles wide; a shoal extends about a cable from it, and bears S. $\frac{1}{2}$ W. 10 miles from Devils point; and from this line the bay is about 5 miles deep. At 4 miles to the north-west of the town there is a remarkable chalky cliff. The south shore is generally steep-to, with a depth of 13 to 19 fathoms 2 or 3 cables off; the north shore is, however, skirted by a reef at nearly that distance from Devils point, as far as the river Guespes, three-quarters of a mile north of the town; and the south side in places is also equally foul. From the shore the land rises to a considerable elevation, and the locality of the bay is pointed out from the offing by the remarkable mountain called Devils peak, which, 25 miles E. by S. from the town, rises to

* Navigating Officer, H.M.S. *Druid*, 1881.

† See Admiralty plan :—St. Mark bay, No. 465; scale, $m = 2$ inches.

the height of 5,100 feet. Temporary anchorage will be found off either the north or south end of the town, in about 18 fathoms water, at about 2 cables from the shore.

Morne a Vigie, situated eastward of the town of St. Mark, is a conspicuous flat-topped hill; when bearing East this leads to the anchorage.

Anchorage.—The usual anchorage in St. Mark bay is in 15 fathoms, at about $1\frac{1}{2}$ or 2 cables from the shore, south of the town and north of the cemetery, which is whitewashed.

Vessels loading logwood and coffee moor with hawsers secured to anchors buried on the beach, and remain in security at this anchorage in all seasons.

Fort Castries, formerly situated southward of the town, no longer exists, and its ruins are covered with trees and bushes.

An old fort stands on the Morne de la Gorge des Guespes, a hill on the north side of the bay.

From St. Mark point the low and bushy coast, forming a curve about a mile deep, trends in a south-east direction 8 miles to Montrou point; thence for 18 miles farther to the village of Arcachais. It is steep-to as far as the bank north-east of the Arcadins, and there is deep water a cable from the beach. The land at the back is mountainous and luxuriant with vegetation.

The Arcadins* are three small bushy islets about 30 feet high, extending over the space of about a mile, in a north and south direction, the nearest and smallest being about $3\frac{1}{2}$ miles from the shore. On the east they are bold and steep-to, with from 20 to 6 fathoms water between them and the main, but the soundings are variable; near them the bottom is hard, but as the shore is approached it becomes soft and muddy. A coral bank extends N.N.W. about a cable from the smallest islet, and a shoal of 3 fathoms lies 6 cables W.N.W. from the southern one. At the distance of $2\frac{1}{2}$ miles East southerly, from the southern islet, and about 2 miles from the coast, there is a shallow bank of $1\frac{1}{2}$ fathoms, with shoal water extending 2 miles south-eastward of it. Between it and the islets there are from 6 to 18 fathoms, and between it and the shore 7 and 14 fathoms.

The best anchorage will be found in 11 or 12 fathoms water, with the smallest islet bearing about S.W. distant about a mile. Vessels bound to Port-au-Prince would find this a good place to anchor for the night, if near it at sunset, with a land wind.

LIGHT.—On the N.W. extreme of the centre Arcadins is a circular white lighthouse, 31 feet high, from which, at an elevation of 36 feet above

* See Admiralty chart :—Approaches to Port-au-Prince, No. 801; scale m , = 0.4 of an inch.

the sea, a fixed white light is exhibited, visible 9 miles (which is obscured by trees between N. $\frac{1}{4}$ W. and N. $\frac{3}{4}$ E.).

Arcachais.—The village of Arcachais is about $8\frac{1}{2}$ miles eastward of the Arcadins, and off it there is anchorage in 15 fathoms at half a mile from shore, with the village bearing N.W. by W. At 5 miles to the south-east of Arcachais is the village of Boucassin; south of it, at a quarter of a mile from the beach, there are 8 fathoms water. There is a small islet called Carnero or Sheep cay, lying E.S.E. of Boucassin, but so close to the shore as not to be easily recognised; it is bold and wooded, but there is no passage between it and the land.

Foso road.—Four miles southward of Carnero islet is the road of Foso, in which there is good anchorage near the shore, in 18 to $6\frac{1}{2}$ fathoms water, mud. From the shore commences an extensive low plain, enclosed by lofty mountains, called the Cul-de-sac, which extends from the Grande river as far as to the southward as the city of Port-au-Prince.

GONAVE ISLAND.—This island fronts the bight of Port-au-Prince, and is about 32 miles long in an E.S.E. and W.N.W. direction, 7 or 8 miles broad, and of considerable elevation. When seen from the north-west two remarkable hills present themselves, and the highest, called the Table, from its flat summit, rises from the south-east end of the island to the height of 2,500 feet. The west coast is a rather low iron-bound shore, bold and steep-to, having 15 to 18 fathoms water, at a cable off.

Gonave is nearly connected to San Domingo by a bank of irregular soundings, varying from 2 to 10 fathoms, coral, sand, and mud. This bank* is steep-to on its western and southern sides, and it extends about 5 miles to the north-east of little Gonave island, deepening quickly to the northward of the line of soundings joining it to the Arcadins. The northern side of the island forms with the opposite shore the channel of St. Mark, which, at its narrowest part, between Galet and Montrou points, is 8 miles wide; and it is about the same distance across to the Arcadins.

North and N.E. coasts.—The north coast of Gonave, from Mangles point, the north extreme of the island, to Gros islet, is foul to the distance of a cable, where the depth is from 3 to 5 fathoms; from the latter to Mare islet, the reef extends out from one-half to three-quarters of a mile, leaving between it and the shore an anchorage for droghers. From Mare islet to Galet point, the north-east extreme of the island, the shore is clear; but from this point, which is low, to within 2 miles of Bluff point, it is skirted to the distance of more than a mile by a broken reef.

* See Admiralty chart, No. 801; Approaches to Port-au-Prince.

Anchorage.—Within the reef there is a depth of 4 and 5 fathoms, white sandy bottom, and several openings fit for vessels of 9 or 10 feet draught. The best of these openings will be found in front of the fishermen's huts, and the best anchorages off the bays Galet, Trou (or Cove), Constantin, and Piron, just within the edge of the reef, and about 80 fathoms from the shore.

South-east coast.—At the east end of Gonave island, Grand bay is between Bluff and Fantasque points; the latter, which is the south-east extreme of Gonave, is a very conspicuous white bluff cliff, and the land forms a small peninsula 2 miles in extent north and south, and about one mile east and west.

About a mile to the eastward of the bluff is little Gonave, which is foul on its north side to the distance of half a mile. To the eastward of the islet there are several large rocky patches, extending about 2 miles, with from one to 3 fathoms water on them; on the south-eastern shoal are two small cays, called Sable and Frégate-le-Croissant. There is a channel carrying about 3 fathoms water, between the cays and little Gonave, and also between the latter and Fantasque point; but the current is so strong and variable that it would be dangerous to attempt either without a leading wind.

Anchorage.—Small vessels will find an anchorage under the west end of little Gonave, and it had better be entered from the southward. The only spot where vessels of large draught can anchor safely is in Park bay, westward of Fantasque point; its entrance, however, is so beset with dangerous rocky shoals, not easily seen, that it requires the assistance of a pilot.

South-west coast.—From Park bay to the westward the coast is generally skirted by detached reefs, and is dangerous. Small vessels, however, with the help of the pilot, will find their way through to anchorage in the bay of Mahotièrre or that of Baleines. Here there are from 15 to 18 fathoms on the edge of the reefs, which extend from three-quarters to $1\frac{3}{4}$ miles from the shore. A remarkable white spot may be observed at about 13 miles from the west end of the island.

Water.—Good water may be obtained at about 5 miles eastward of the north-west point of the island.

PORT-AU-PRINCE.*—The bay of Port-au-Prince is between Cul-de-sac point on the north and Lamentin point on the west; both are low and woody, and the former lies N.E. about $5\frac{1}{2}$ miles from the latter.

* See Admiralty plan:—Bay and harbour of Port-au-Prince, No. 464; scale, $m=1\cdot5$ inches.

The city,—which is the capital of Haïti, or the western division of the island,—stands at the bottom of the deep bight, on the northern declivity of a fork of the great mountain ridge which runs through this end of the island from east to west: Princes peak, about 10 miles from the city, is 5,000 feet in height. The population is about 22,000. The exports are mahogany, logwood, cocoa, tobacco, ginger, and large quantities of excellent coffee. Their value in 1874 was estimated at 1,000,000*l.*, and the imports at a like amount.

Many lines of steamers call here regularly, amongst which are the R.M. steamers and the W.I. and Pacific Co.

The city is protected on the east by fort Alexander, on a hill 370 feet above the level of the sea, and is a remarkable object, having 2 signal staffs on it. Near the north end of the city is the inner harbour, with a depth of 4 fathoms and secure, but here the stench from the sewerage of the town is unbearable; it is only capable of containing a few vessels moored head and stern. The depth is reported to be shoaling. On its northern side is a little cay called Fort* islet, on which there is a small water battery, which with other works along the shore, command the anchorage. Fort Bizothon, the westernmost defence, is a low square† building standing close to the shore, about 2 miles from the city, and about half a mile westward of it is Tor house, the country residence of the late Emperor of Haïti. The buoys which at times mark the harbour shoals are not to be trusted to, and near the entrance to the inner harbour there are two patches with a depth of 19 feet on them.

The easterly breeze generally commences at daybreak, and changes to the westward at 1 or 2 p.m., the change being often accompanied by a heavy squall. During April and May, and often until the autumn, it rains between 6 and 9 p.m., which generally comes from the eastward. The land wind in this vicinity varies with the direction of the coast.

LIGHT.—A skeleton white lighthouse is erected between Tor point and point Lemantin, but nearer the latter; it is 93 feet high, from which, at an elevation of 97 feet above the sea, is exhibited a revolving red light, showing a red flash every half minute; it should be seen 15 miles in clear weather.

Water.—The watering place at Port-au-Prince is at a small stream a little eastward of fort Bizothon; the shore, however, is so foul that the boats must be anchored off the shingle beach and the casks rafted. The best time to water is at early dawn and evening, when the pool is not occupied by washerwomen; also at the landing-place, the northern-

* A lighthouse, to show a fixed light, is to be erected on Fort islet.

† Fort Bizothon, the foundation walls of which are still standing, has the appearance of a great square heap of ruins.—Pola, N. to M., No. 10, 1886.

most of two wharves abreast the custom house, water may be obtained from a pipe, which is high enough for a boat to lie underneath it.

Supplies.—Fort island is used for the storage of coal, and two red mooring buoys have been placed westward of the island on the northern side of the channel to Inner harbour; there is a good market with reasonable prices.

Tides.—It is high water, full and change, at Port-au-Prince at about 8h., and the rise is a little more than one foot, but after fresh easterly winds it is about half a foot less.*

Pelican cays and reefs.—The bay of Port-au-Prince is almost blocked up to the northward by numerous shoals and small islets which protect the anchorage. The outermost are the Pelican cays, which lie N.W., distant 5 miles from fort Alexander, about N.N.E. $\frac{1}{2}$ E., $3\frac{1}{2}$ miles from Lamentin point, and $2\frac{1}{4}$ miles from the nearest part of the eastern shore; they consist of five small low sandy and mangrove cays occupying a space of about three-quarters of a mile in a north-east and south-west direction; on their north side may be approached to half a mile. Reefs extend E.S.E. from the cays for $1\frac{1}{2}$ miles, or to within three-quarters of a mile of the eastern shore, and to the south-west to within $2\frac{1}{4}$ miles of Lamentin point. At about $1\frac{1}{4}$ miles to the southward of the cays there is a detached rocky shoal, half a mile in length north and south, named Sand cay shoal; it lies N.W. by W. $\frac{1}{2}$ W. $3\frac{3}{4}$ miles from fort Alexander, and on a clear day both it and the Inginac shoals can be easily seen.

The Inginac shoals, about a mile to the south-east of Sand cay shoal, are two rocky banks nearly dry, three-quarters of a mile in extent north and south, and nearly connected to the low cays on the north side of the harbour.

Directions.—The channel for large vessels to the roads and harbour of Port-au-Prince lies between the south-west end of the shoals just described and the main; and in the narrowest part, between Sand cay shoal and Tor point, it is $1\frac{1}{2}$ miles wide. The soundings throughout are very irregular, varying from 20 to 4 fathoms; the ground in many parts foul, and the southern shore is skirted by a rocky ledge to the distance of nearly 2 cables.

Vessels approaching by St. Mark channel, and being abreast Montrou point, may choose either the inside or outside channel of the Arcadins. The former leads farther to windward, with the land wind, and the Arcadins should be passed at the distance of about a mile, and the course continued until southward of the $1\frac{1}{2}$ -fathoms shoal lying 2 miles from the main, but it will be prudent at night for strangers to take the outside channel or that between the Arcadins and Gonave island.

* H.M.S. *Woodlark*, in March 1875, found a rise of 3 feet at Port-au-Prince.

The sea breeze in the outside channel during daytime generally blows from the W.N.W., and is, therefore, a fair wind. When near Montrou point, Princes peak will probably be sighted. The peak kept on a S.E. $\frac{1}{2}$ E. bearing will lead westward clear of the Arcadins, and up to Lamentin point, about 18 miles farther on. When fort Alexander comes open to the southward of Fort islet, E. by S. $\frac{1}{2}$ S., a vessel will be to the southward of the Pelican reefs, and may haul up for the roads.*

Good anchorage in the roads will be found with fort Alexander E. $\frac{1}{2}$ S., and fort Bizothon S.S.W. $\frac{3}{4}$ W., in 12 fathoms water, mud and sand. A more convenient berth for watering would be with fort Alexander E. $\frac{1}{2}$ N., and fort Bizothon S. by W., in about 13 fathoms clear ground; but be careful not to anchor on rocky bottom. In the centre of the roads there is a small coral patch with 4 fathoms water on it, lying with fort Bizothon S. by W. $\frac{1}{2}$ W., and Fort islet about E. by N. $\frac{1}{4}$ N.; Lamentin point just open of Tor point will place a vessel close to the southward of it. There are other shallow patches, but they may be seen in clear weather.

Leaving this anchorage, if bound to the northward, it will be better to weigh about midnight with the land wind, which will most probably take a vessel to the Arcadins by daylight, and through St. Mark channel before the sea breeze sets in, which is generally between 10 a.m. and noon. In the winter season the land wind will sometimes blow a double-reefed topsail breeze, with heavy squalls, for several days, and attention has been called in page 251 to the heavy squalls which will be met with here in the hurricane months. Should the land wind fail before the vessel is clear of the Arcadins, it will be better to anchor near them, and wait till it comes off again about 8 or 9 p.m.; a strong easterly current is at times experienced.

Rochelois bank.†—If bound to the westward from Port-au-Prince, or in beating up from that quarter through the Gonave channel, great caution is required in approaching a rocky bank, named the Rochelois, which is about 5 miles in length east and west, and 3 miles in breadth. Near the centre of the bank are three or four small low rocks 3 feet above water, called the Pirogues, whilst others barely uncover at low tide, and when seen from a distance of 3 miles to the northward appear as some fifteen or twenty small rocky pinnacles. A few mangrove bushes grow on them; at half a mile N.N.W. of the former there is a small patch with about 2 fathoms water on it, and another of the same depth at 3 cables N.W. The soundings on other parts of the bank are very irregular, varying from 4 to 10 fathoms, with sand between the rocky heads, and the bank is

* N.O., H.M.S. *Griffon*, 1883, gives the following:—The leading mark for large vessels is a black ball in a white triangle (on a building with a clock over it) in line with the red gate of fort Ruperta (probably fort Alexander) will lead clear of the 4-fathoms bank on the starboard hand and all shoals on the port hand.

† It is proposed to build a lighthouse to show a flashing light on this bank.

steep-to. The central part lies nearly S.S.E. from the west end of Gonave and north of a remarkable isolated mountain, about 2,600 feet high, 9 miles westward of Miragoane, and 3 miles inland. Its northern edge is 9 miles from the nearest part of Gonave, and its southern edge about 6 miles from the shore of San Domingo.

*A coral patch, on which the United States ship of war *Vandalia* struck on the night of the 21st of April 1876, and remained aground until the following morning, was estimated by the officers of the ship to lie South, distant 2 miles (approximately) from the Pirogues; the least water found at one cable from the ship was 6 feet.

Léogane.—From Lamentin point the coast takes a westerly direction for $8\frac{1}{2}$ miles, when it bends round to the south-west for 5 miles to the port and river of Léogane. The first part of the coast has a depth of 10 fathoms about a quarter of a mile off shore, and off the latter part it is foul for about the same distance. Off the entrance to this river there is anchorage in from 8 to 13 fathoms, taking care to avoid a patch of $1\frac{1}{2}$ fathoms about a third of a mile from the shore; here the edge of the bank is about a mile to the westward. From Léogane the coast trends to the S.S.W. for 6 miles, and then resumes a westerly direction.

Grand Goave bay.—Between Léogane point and Grand Goave bay the coast is low and wooded, and off it there is anchorage in 7 or 8 fathoms water. Grand Goave bay is about $8\frac{1}{2}$ miles from Léogane point, but it affords no good shelter. A short distance eastward of it there is a little wooded islet, and the town will be seen on the left bank of a small river.

Petit Goave bay† is separated from the above by a large bluff headland, 1,500 feet high. It is formed between Rocky point on the east, and that of Antonio on the west. This last point is the north extreme of a small peninsula extending a mile eastward, and forming on its south, and on the west side of the bay, the carénage, a small well-sheltered and safe inlet with 3 to 7 fathoms water, with 3 small islets at its entrance. On the eastern shore north-west of the town is a small sandy islet, called Anglais or Poules, and half a mile westward of it is a rocky bank with 2 fathoms water on it. The passage between the islet and eastern shore carries from 13 to 3 fathoms irregular soundings.

The small river Kiment runs into the bay south of the town, and a circular battery stands north of its entrance. On the south-west and west

* The steam ship *Andes* in 1879 grounded on a shoal (a small mound) having 23 fathoms within 20 feet of its centre, due North of the Town of Petit rivière, she remained aground for 15 hours. The position of the shoal is very vaguely stated, it is assumed to be a part of the Rochelois bank.

† See Admiralty chart, No. 801 :—Approaches to Port au Prince.

sides of the bay are the mouths of two other rivers, and north of them is fort Royal, which commands the bay. The bay is open to the north and the soundings are deep and irregular, but anchorage will be found in 6 or 8 fathoms water, with the islet bearing North or N. by E. distant 2 cables. The approach to the anchorage is westward of the 2-fathoms rocky bank.

Water may easily be obtained from the rivers which run into the bay.

Miragoane harbour* lies about 12 miles westward of Petit Goave, and nearly midway between there is a remarkable clear spot on the side of a mountain presenting the appearance of a narrow scorched grass field; the mountain rises from the shore to about 2,000 feet high, and at its base are some conspicuous white cliffs. The bay is about $3\frac{1}{2}$ miles wide at its entrance and $1\frac{1}{2}$ miles deep, and protected on the north by a reef in places almost dry, and which has $3\frac{1}{2}$ and 4 fathoms water on other parts of it, which stretches across the bay from its western extremity, leaving a deep passage about a mile wide between the east end of the reef and the shore, in which the bottom is plainly visible; but with the town bearing S.W. by S. not less than 7 fathoms was obtained by H.M.S. *Dido* in 1882. The deepest water is said to be with the town S.S.W. There is anchorage outside the barrier reef in 6 fathoms by looking out for a spot clear of rocks.—H.M.S. *Griffon*, 1883. The anchorage is three-quarters of a mile within the reef, about half a mile N.W. by N. of the fort, in 10 or 12 fathoms water. There is also a snug spot in the south-west part of the bay, between two islets and the main, with 7 and 8 fathoms in it, but it is very narrow. Ships loading lie alongside the town.

Water.—A spring of excellent water will be found in a cove at $1\frac{1}{4}$ miles eastward of Miragoane; the cove carries a depth of $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, but a bar of 12 feet runs across its entrance.

Rochelois.—The village of Rochelois stands about 4 miles inland, near the base of the lofty peak of Miragoane; the point of the same name is about $3\frac{1}{4}$ miles westward of Black isle, a small cay in the reef near the west end of Miragoane bay, with the river about $1\frac{1}{2}$ miles further on.

The coast.— $4\frac{1}{2}$ miles westward of Rochelois point is the fort and town of Petit rivière; $2\frac{1}{4}$ miles beyond this is a remarkable sandy cliff; then follows the Petit rivière, and $3\frac{1}{2}$ miles westward of the sandy cliff is the village of Anse à Veau. Thence the shore is composed of black perpendicular cliffs, about 20 feet high, for $9\frac{1}{2}$ miles farther westward to another village called Petit trou, which is about $3\frac{1}{2}$ miles eastward of the entrance

* See Admiralty plan :—Miragoane harbour, No. 803; scale, $m = 3\cdot6$ inches.

to Baradaïres bay. All this part of the shore is bold and steep-to, and affords no shelter. But there is anchorage for small vessels off the village in $2\frac{1}{4}$ fathoms water.

Baradaïres bay* is open to the eastward, about 4 miles wide north and south, and 7 miles deep. The northern side is formed by the peninsula of bec-a-Marsoin, which will be readily recognised by the deep bay at the back. The shores of the peninsula consist of perpendicular rocky cliffs, about 20 feet high, much worn and fissured by the sea, and having occasional sandy patches. In-shore of the cliffs is a low table land covered with dense foliage, decreasing in height towards Fantasque point, which is low, rocky, and projects to the northward. The mainland is mountainous. At the entrance on the south-east side of the bay, near Picolet point, are several small cays, from which a reef stretches across to within nearly half a mile of bec-a-Marsoin point—the east end of the peninsula—leaving a small channel along its south side deep enough for vessels of the greatest draught, but it requires the assistance of a pilot, for the anchorage is encumbered with many shoals.

Cayemites bay.*—The entrance to this extensive basin is about a mile in breadth, and lies between Fantasque point, $7\frac{1}{2}$ miles westward of the east end of the bec-a-Marsoin peninsula, and the great Cayemites island. There is a small shallow bay $3\frac{1}{2}$ miles to the westward of bec-a-Marsoin point, at the bottom of which is a short sandy beach, the only landing-place to the eastward of Fantasque point. There is a small fishing village near the beach, but no protection for vessels. The channel close under the island is deep and about a mile in width.

Au Bas village.—The village of Au Bas is situated half a mile to the westward of Fantasque point.

Reef.—From the shore of the village of Au Bas a reef extends to the west and W.N.W., a distance of 3 miles, narrowing the channel between the reef and great Cayemites island to three-quarters of a mile. The eastern part of the reef dries at low tide and shows only a few black heads at high water, the western part of the reef has several heads with only 2 fathoms water, but there are places which may be crossed in 3 fathoms.

A quarter of a mile to the south-westward of Au Bas is the first of a chain of small islands, covered with low mangrove bushes, and extending along the shore to the south-west for the distance of a mile. Between the islands and the main there is a boat passage.

Pestal.—Nearly 6 miles W.S.W. from Au Bas is Pestal, a town of some importance situated in a small inlet between high hills. Very little of the

* See Admiralty plan :—Cayemites and Baradaïres bays, No. 463 ; scale ; $m = 0.5$ inch.

town is visible from the sea, only two or three houses on the beach and a few more on the top of the hill.

Great Cayemites island is 5 miles long W.N.W. and E.S.E., $2\frac{1}{2}$ miles broad, 500 feet high, and thickly wooded; about half a mile to the westward of it is little Cayemites, a small islet $1\frac{1}{2}$ miles long and three-quarters of a mile broad, with a channel of 2 fathoms water between. From the latter islet an extensive reef sweeps outwards to the W.S.W., and connects itself to the shore about 15 miles to the westward of Fantasque point, completely sheltering the bay from the northward.

There is also a passage, with $1\frac{1}{4}$ to 2 fathoms water, running north and south, for small vessels, westward of the little Cayemites, over the white sand-bank between it and Great reef. The latter is covered with about a foot of water, and on it are several rocks or small cays. To the south-westward of Great reef there are two groups of cays covered with trees, which shelter the bay on the west. Near the coast of San Domingo there are various other cays and reefs.

Anchorage.—The first secure anchorage westward of bec-a-Marsoin point is in 7 fathoms, with Fantasque point bearing E. by N., and the western end of the chain of islands extending from Au Bas, bearing S. by E. In this berth the reef, with only 2 or 3 fathoms water, is about a cable distant; do not shoal less than 5 fathoms as the soundings are irregular.

Large vessels may anchor in the bay close under the south-west side of great Cayemites, or on the eastern side in Flamencos bay, off a sandy shore and in any convenient depth. Small vessels may anchor close in shore.

Directions.—In entering Cayemites bay from the eastward, keep about 3 cables distant from the shore of the peninsula; no bottom at 20 fathoms will be found at that distance. As already mentioned, the channel between great Cayemites and the reef extending off Au Bas is three-quarters of a mile wide, and has from 3 to 5 fathoms. There is deep water within 3 cables of Fantasque point, and 10 fathoms at a mile west of it. Do not haul in round the banks to the westward of Fantasque point before the west end of great Cayemites bears North, or the channel westward of it is well open; there is a patch with a depth of 3 fathoms southward of little Cayemites.

Patte large bay.—Between Cayemites bay and the village of Jérémie, 18 miles westward, the coast is clear of danger. In general it is rather low and covered with trees. 5 miles from the village of Cayemites there are some remarkable white cliffs extending about 4 miles east and west. To the eastward of the cliffs is Patte large bay open to the north. Its mouth

is 7 cables wide and obstructed by reefs, which small vessels only can cross, when they gain shelter under cover of the reefs. Patte large, the western point, is foul, and here the cliffs above mentioned commence. Temporary anchorage may be had in 3 fathoms water, north of Patte large, at 3 cables from the reefs which shelter it.

Four miles westward of Patte large point is the river Roseaux, at the eastern part of Grand anse; this bay terminates westward in Jérémie point, which is narrow, extends eastward about half a mile, and shelters on the north the anchorage of the same name.

Jérémie bay* is a small open semicircular bay, and known by the village of the same name. The edge of soundings lies about three-quarters of a mile from the shore, and on the bank before the town the depth is from 3 to 6 fathoms; but being exposed to the full force of the north-east winds, in strong breezes the sea breaks, and the anchorage consequently is not safe. The village is protected by a fort on the north point of the bay, and a small river empties itself into the sea at half a mile to the south-east of the village.

The point is surrounded by reefs which extends 2 cables eastward. To the south of the point and near the reef which borders it is another small reef, named Mouton, south of which is the anchorage, fit for small coasting vessels only, in 3 or 4 fathoms water.

The leading mark given on the plan, viz., house on beach in one with summer house, S. by W. $\frac{1}{2}$ W., must be used with caution, as several more houses have been built on the beach. The port is open to foreign trade.

Trou à Cochon.—The coast westward of Jérémie point to trou à Cochon, a distance of $1\frac{1}{2}$ miles, is clear of danger and formed of steep cliffs. Trou à Cochon is a small bay, and a reef extends a short distance from its eastern point; it is somewhat sheltered from the north, and has about $1\frac{1}{2}$ fathoms water. At a quarter of a mile outside it there are 3 and 4 fathoms.

Sal point, the most northern point of this part of the island, and about 4 miles westward of trou à Cochon, the coast between being formed of steep cliffs; 3 miles farther on is the small bay of Clerc, open to the north, but in case of necessity can be used by small vessels; a rivulet empties itself into the bay. About 2 miles westward of Clerc bay is that of Bon, fit for coasting vessels, separated from it by a large round promontory; a rivulet runs into it. Then follows another small bay and village; and $2\frac{1}{2}$ miles beyond the latter is Chaloupe bay, fit also for small vessels, and 4 miles farther on is Seringue point.

* See Admiralty plan :—Jérémie bay, No. 803; scale, $m = 12 \cdot 4$ inches.

Seringue point and bank of soundings.—Seringue point, the north-west extreme of San Domingo, is a bold prominent headland, and eastward of it is a little bay which can be used by small vessels. From this point commences an extensive sand-bank with irregular soundings, which sweeps off to the westward for 8 or 10 miles, and borders the coast southward as far as cape Tiburon; the edge is abrupt, and the depth generally under 20 fathoms, decreasing to the coast; the water is so clear that the sandy bottom may be easily seen.

The bay between Seringue point and cape Dame-Marie affords no anchorage, as the coast as far as the cape is skirted by rocks which extend off about three-quarters of a mile. The bays between capes Dame-Marie and Tiburon are exposed to westerly winds, and afford no safety from September to March, when north-west winds prevail, during which period they are seldom visited.

Cape Dame-Marie, the north-west extreme of the long narrow peninsula or neck of land forming the west end of San Domingo, is rather low, and on its extremity there is a small hill. At $1\frac{1}{2}$ miles westward of it the depths are from 14 to 17 fathoms, and 7 to 8 fathoms within a mile. From the cape the shore to the southward bends in as far as the village of Dame-Marie, forming a bay $3\frac{1}{2}$ miles in extent and about a mile deep. A short distance to the southward of the cape there is a similar projection, called the False cape, and between them a reef skirts the shore to the distance of $1\frac{1}{2}$ cables.* In the north-east corner of the bay is the Petite river and village. The village of Dame-Marie is in the south part of the bay, and about midway between it and Petite river is a remarkable white cliff called the Twelve apostles.

Anchorage.—Good clear anchorage will be found almost everywhere in this bay with the prevailing wind, which under the land is generally from E.S.E. to N.E. The most convenient berth, if intending to water at the Petite river, is in 5 fathoms, at half a mile W.N.W. of the battery.* At a mile from the shore the depth is from 4 to 6 fathoms, and at 2 miles 7 to 9 fathoms.

The COAST from cape Dame-Marie runs about S. by W. for 13 miles to Irois point, with several small bays between. Rousselin point, the south extreme of Dame-Marie bay, is formed of cliffs, and has a small round hill on it. Between this point and that of Baleine south of it, are

* There is a small rock which lies about 4 cables S.S.E. from False cape with 14 feet on it and 3 fathoms close to, but did not verify its position. The port of Dame-Marie is closed to foreign trade.—Navigating officer, H.M.S. *Griffon*, 1883.

the three bays of Bayardelles, the two southern of which are separated by a bluff point, also with a small round hill on it, called Minister head. In Bayardelles bays there are no dangers, and in the northern one there is anchorage in 6 to 8 fathoms water, sand. Generally, all along this part of the coast, a vessel will find anchorage, as there are neither shoals or any hidden danger, the water shallows as the coast is approached, and the lead is a sufficient guide.

The Whale rocks form a small rocky cluster rising just above the surface, from a white bank of 4 fathoms, about a cable in extent; they bear S. by W. $\frac{1}{2}$ W. $7\frac{1}{2}$ miles from cape Dame-Marie, and lie half a mile from the shore, with a clear $5\frac{1}{2}$ -fathoms channel between; about a cable outside them the soundings are 11, 10, and 7 fathoms, hard bottom, probably coral. The sea always breaks on them.

Boury point is a remarkable bluff brown cliff, with a small rock near it just awash, and should not be approached within 2 cables. The bay of the same name is formed between it and Baleine point north of it, where there is anchorage in 6 or 7 fathoms water at half a mile southward of the Whale rocks.

Nault bays are formed between Boury point on the north and Hospital point at two miles south of it; the northernmost and largest of these bays affords very good anchorage. At a short distance within Boury point is the town, overlooked by lofty mountains, one of which terminates in a remarkable peak. Not far from the south end of the town may be seen a little rounded height rising abruptly from a cliff on the shore and crowned by a fort. The shore is quite clear, the soundings regular, and the most convenient anchorage for vessels of light draught is in about 5 fathoms, with the peak in line with the tower of the village church bearing about E. by N. $\frac{1}{2}$ N. Water may be obtained from a river which empties itself into the northern bay south of the village. Hospital bay lies between the point of the same name on the north and that of Laborie on the south. It is clear of danger, and in its middle there are 4 and 5 fathoms water.

Pedro José point.—The bay of Laborie, southward of the former, terminates on the south in Pedro José point. At a quarter of a mile from the point is an islet on the extremity of a reef, which is connected to it, and skirts all the southern part of Laborie bay. Coasting vessels only can anchor in this bay in 2 or 3 fathoms water, south of Laborie point, where it is clear of danger. There is anchorage in 8 or 9 fathoms water $1\frac{1}{2}$ miles from the shore.

Pedro José bay.—The low point of Pedro José and the islet off it shelters on the north the anchorage in the bay of the same name

which terminates at Ibar point, 2 miles south of the islet. The white sand-bank which borders the islet continues round the bay at the distance of 2 or 3 cables from the shore. The bank is steep-to, with about $1\frac{1}{4}$ fathoms water on it. From a line drawn from Ibar point to Joseph islet the soundings diminish gradually from 4 to 2 fathoms as the shore is approached.

In the northern part of the bay there are several hidden dangers. One of them, with about 4 feet water on it and 4 fathoms near it, lies nearly half a mile S. $\frac{1}{2}$ W. from the islet. At the same distance S.E. $\frac{1}{2}$ S. from the islet is another rocky bank, 2 cables in length and one in breadth, with 4 to 8 feet water on, and $2\frac{1}{2}$ fathoms near it. Two cables eastward of the latter is another patch with $1\frac{1}{4}$ fathoms on it.

The bay of Pedro José is surrounded by high mountains, at the foot of which and along a fine sandy shore is the village. To the southward of the village a river runs into the bay, after traversing a small plain. Water may be obtained.

A small vessel entering this bay should bring the last houses of the southern part of the village to bear East, pass southward of the dangers in the northern part of the bay, and anchor in about 3 fathoms water with the islet bearing about N. $\frac{2}{3}$ E. When the sky is clear the bottom can be seen very distinctly. Large vessels generally anchor in about 7 fathoms water with the islet N.E. by E.

Espanol bay.—This small bay affords but indifferent anchorage for small vessels, and is formed between Ibar point on the north and Fanchon, a broad cliffy point, on the south. It is bordered at a cable from the shore by a white sand-bank or reef which skirts the latter point, and terminates south of it. At the head of this bay there is a house standing on a small hill. Large vessels may anchor outside the bay in 6 or 7 fathoms water.

Bigie and la Croix bays.—Between Fanchon and Irois points are the two bays of Bigie and la Croix, separated by a remarkable bold conical point which rises abruptly from the sea. The shore of Bigie bay is of sand, and a house stands in the middle of the bay on one of the projections or spurs of the high land of the point. The shore of la Croix bay is also of sand, and a rivulet runs through it; to the north-east of its mouth a house stands on a hill. These two bays afford no shelter whatever with westerly winds, but anchorage will be found in 7 or 8 fathoms water, at three-quarters of a mile from the shore, or farther out in 10 or 12 fathoms, sandy bottom, at $1\frac{1}{2}$ miles off.

Irois point is the western extreme of San Domingo, and although low, may be readily distinguished by a small detached hill on its extremity, which at a distance has the appearance of an islet.

Irois bay, about 2 miles in breadth and half a mile deep, is formed between the point of the same name on the north and cape à-Foux on the south. In the north-east part of the bay is the village of Irois, standing above a small plain, irrigated by a river of good water. A little southward of the mouth of this river is a small group of black rocks detached from the shore, and off a white sand-bank. At half a mile southward of the rocks is another rivulet. The bay is clear of danger, and in the southern part of it there are from 5 to $8\frac{1}{2}$ fathoms water. On the line of the two entrance points there are $8\frac{1}{2}$ to 10 fathoms, sandy bottom, and the depth gradually diminishes to the shore. Several small black rocks are visible near the shore in the southern part of the bay. A vessel may round Irois point at a short distance, and anchor in 7 or 8 fathoms water, sand and shells, with the largest black rock bearing about E. by S. $\frac{1}{2}$ S. distant 4 cables; or in $5\frac{1}{2}$ or $6\frac{1}{2}$ fathoms, sand and mud, with the large black rock S. $\frac{1}{2}$ W. distant half a mile. Although the bay has good anchorage, north-west and south-east winds cause a heavy swell to roll in, which renders it uneasy, and landing often difficult.

Carcasses bay, between cape à-Foux on the north and Carcasses point on the south, about three-quarters of a mile apart, has 6 and 7 fathoms water at its entrance, which diminishes as the shore is approached. At the head of the bay three rivulets empty themselves, and to the north is a house on a hill. The land which encircles this bay is very high, as at all the others of this part of the coast of San Domingo. Small vessels anchor in the middle of the bay in 5 or $5\frac{1}{2}$ fathoms water, sand and mud. Large vessels may anchor at $1\frac{1}{4}$ miles from the points of entrance in 11 or 12 fathoms.

Cape Tiburon.—Carcasses point, and that of Locos, a little south of it, appear at a distance to be one large bold point which terminate in cape Tiburon. These three when seen at a distance appear as one, and are known under the general name of cape Tiburon. The real cape Tiburon is easily known by its appearance, as it forms a massive, lofty promontory, rising abruptly from the shore to the height of about 700 feet, and then gradually ascending to the rounded summit of a mountain 2,850 feet high, about a mile from the coast. This mountain, called Tiburon, is at the extremity of the great range of la Hotte, which extends from west to east far into the interior, increasing rapidly in height, a lofty peak about 8 miles eastward being 4,180 feet above the sea.

Locos point is skirted by a reef at the distance of a cable, and several heads of rocks are uncovered. The reef continues along the coast as far as the entrance to Tiburon bay, and is steep-to; southward of cape Tiburon foul ground extends for nearly half a mile. Near it there are 11 and 12

fathoms water, at 2 cables from it 20 to 24 fathoms, and a little farther off no bottom with 40 fathoms.

Tiburon bay.*—From cape Tiburon the shore takes an E.S.E. direction for $1\frac{1}{2}$ miles to a bluff rocky point, when it trends E. $\frac{1}{2}$ S. 3 miles, then turning sharply to the S.S.W. for three-quarters of a mile to Burgos point, and forming the bay of Tiburon. The latter point is of moderate elevation, and skirted by a reef at the distance of a cable, which continues along the coast eastward for a mile. The distance between the two points is 3 miles, and the bay is one mile deep. The north coast is steep, the land high, and at the head of the bay there is a small triangular plain enclosed between mountains. It is irrigated by the river Tiburon, which is divided into several branches, of which one only reaches the sea north of the village, in the south-east angle of the bay, which is defended by a battery.

Off cape Tiburon the land wind is fresh during the night from N.E. The sea breeze blows from S.E. by E., and lasts all day, especially from May to September. During the other months the land wind is E.N.E. and often veers to S.E.

Anchorage.—The best anchorage in Tiburon bay is in 4 or 5 fathoms water, with Burgos point S. by E. and cape Tiburon about W.N.W. There are 4 and $4\frac{1}{2}$ fathoms at a cable from the shore, and on the north side 6 and 7 fathoms, stiff clay, within that distance; there is no shelter against south-west or west winds, and small vessels only are protected from those of the south by anchoring in 2 or 3 fathoms water, in front of the town; but the sea is always smooth, unless with a strong breeze. In entering there are no difficulties but the baffling winds and heavy squalls which come down from the high land, and the only dangers to be avoided are the reefs off cape Tiburon and Burgos point.

Water.—In watering, the casks may be either landed and rolled over a narrow neck of land to the stream, or they may be filled in the boats by buckets. Small supplies and wood may be obtained.

Aspect.—All the southern coast of San Domingo, from cape Tiburon to Beata point, is high, and inland, at a greater or less distance from the sea, are several chains of mountains. The first of these is that of la Hotte, which commences near cape Tiburon, and runs eastward, increasing in height to 7,400 feet at la Hotte peak, about 24 miles from the cape; thence it falls gradually, and terminates a little westward of cape Baienet.

Then commences another chain, which increases in height to the eastward; its principal elevations are those of the Silla and the Bauruco;

* See Admiralty plan:—Tiburon bay, scale, $m = 2\cdot8$ inches, in plans of ports, San Domingo, No. 2,406.

the Silla presents two summits, 8,000 feet above the sea; the Bauruco reaches the height of 2,400 feet, and rises over Beata point. This latter chain terminates near the bay of Neiva.

From Ocoa bay the Cibao mountains extend eastward at a greater distance from the coast than those in the western part of the island; yet between Neiva bay, to the north of which is the remarkable peak of Martin Garcia, and the city of St. Domingo, to the west of which is the smaller chain of Cerro Gordo, the Cibao mountains range to within a short distance of the sea. To the eastward again, there is a large plain which extends to Espada point, the south-east extreme of the island.

Several rivers descend from these mountains, and run into the sea on the south coast of the island. The most important are those between Beata and Espada points. The Neiva rises near the peak of Yaque, and after running through the valley of San Juan empties itself into the bay of Neiva between the Bauruco and the peak of Martin Garcia. The Nisao, and the Ozama, which washes the walls of St. Domingo, and others, join the rivers Macoris, Soco, and Yuma.

Bank of soundings.—The south coast of San Domingo between cape Tiburon and Beata point is bordered by a narrow bank of soundings. This bank is interrupted for a space of about 20 miles west of cape Jacmel; in this space there is no bottom with upwards of 90 fathoms, at from one to 2 cables from the shore. Between Aquin and Sale trou the bank extends off from half a mile to a mile; but from the latter place, as far as cape False, it varies from one to 3 miles from the land.

Between points Beata and Espada the coast is little known; it is bordered by a narrow bank, and the anchorages are generally dangerous, especially during the winter months, when the wind inclines to the southward; generally, too, the winds are strong with almost always a heavy sea.

Currents.—Along the south coast of San Domingo, between Cayes and cape False, the current near the land runs to the eastward, and often sufficiently strong to assist a vessel to windward; but southward of Beata point it runs strong to the westward. Near the land between Beata point and the island of Saona the current also sets eastward.

Milieu bay, sheltered from N.W. round north to S.E., is formed between Burgos and Aigrettes points, and midway there is a remarkable white cliffy point called Tapion. Aigrettes point, with a small round hill on it, is composed of white cliffs of moderate height; there are some houses on the hill and at a distance it appears as an island. Six miles eastward of point Aigrettes is that of Grande; the coast between is low and here and there formed of a dark shingle beach. The land at the back rises rapidly and leaves between it and the sea a narrow strip of land

generally intersected with lakes. The shore all along is skirted by a reef, a portion of which is uncovered. A white sand-bank also borders the shore at a distance of from 2 to 5 cables.

At $1\frac{1}{3}$ miles eastward of Aigrettes point is Bucan Viejo, an opening in the reef of about a third of a mile in breadth, leading into an anchorage of about half a mile in extent, where small coasters find shelter from the prevailing winds. At the entrance there are $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms water, which diminishes inwards to $2\frac{1}{4}$ and $1\frac{1}{4}$ fathoms. In the middle of the harbour there is a small sunken rock. It is easy to distinguish the reef and white sand-bank on this part of the coast, but it should not be approached unless compelled to do so.

The bank of soundings extends 2 miles off with $6\frac{1}{2}$ to 11 fathoms water on it, and in case of necessity anchorage may be had off Milieu bay; and also off the coast as far as Grande point in 6, 7, or 8 fathoms, but there is no shelter and generally a heavy sea.

Anglais bay is inconvenient and affords no shelter; anchorage may however be had in 6 or 7 fathoms water, S.E. of several huts scattered on the beach.

Acul à Jean is a small bay and village, eastward of, and similar to the last; anchorage can be had in 7 or 8 fathoms water about one mile off shore.

Bay of Salée.—This bay is similar to the proceeding, and separated from it by Cardizales point. It is 9 miles eastward of Grande point, and remarkable by two white cliffs. On the shore stands a small village, and a river runs into the sea.

The bay of Three Rivers is larger, there are no dangers, and at one mile from the coast there are 7 or 8 fathoms water, which diminishes gradually to $2\frac{1}{4}$ fathoms at 2 cables from the shore. A village stands on a hill at the back of the shore, at the head of the bay. The hill is 150 feet high, its base is composed of red cliffs and very remarkable. Three rivers empty themselves into the bay, from which it takes its name.

Port Piment, sheltered from N.W. round by north to S.E., is 2 miles south-east of the bay of Three rivers. In the south-east part of the bay a small river runs into the sea, and a village stands on a prominent point which terminates in the south extreme of the port. At a mile from the land there are 7 fathoms water, which diminishes gradually to $1\frac{1}{4}$ fathoms at 2 cables from the shore. A vessel may anchor in 6 or 7 fathoms, with the village bearing about E.S.E., one mile from the shore.

Coteaux bay.—One mile south-east of port Piment is the small bay of Damassin, which terminates to the south in Coteaux point; a small

river runs into the north-east part of it. $1\frac{1}{2}$ miles farther on is the bay of Coteaux, formed between the point of the same name on the north and that of Roches on the south. Reefs extend $1\frac{1}{2}$ cables from these points, and also from a third point in the bay, south of the village. The village of Coteaux stands partly on the shore and partly on the hills at the back. A rivulet empties itself north of the village. The anchorage is in the north part of the bay in 5 or $5\frac{1}{2}$ fathoms water, westward of that part of the village standing on the shore. Half a cable from the shore there are $1\frac{1}{4}$ fathoms water. Small vessels entering should avoid the reefs extending from the points.

Juif bay.—The bay of Roche-à-Bateau follows that of Coteaux, and affords similar anchorage. Here are a few houses, and in the north-east part a river runs into the sea. The bay of Juif, $1\frac{1}{2}$ miles south-east of the former, is $1\frac{3}{4}$ miles wide at the entrance, and the point of the same name on the north is formed of steep cliffs. At the head of the bay a village stands on a bold, round, prominent point, and to the north of it a river empties itself after dividing into two arms just before entering the sea. The land which surrounds the bay is very high and forms two ravines which extend into the interior. A vessel may anchor in the middle of the bay with the village bearing about East, in 5 or $5\frac{1}{2}$ fathoms water.

Port Salut.—The bay of Drick is separated from the preceding by a large broad point composed of high cliffs, is similar to that of Juif, and a rivulet runs into it. The anchorage is in the middle of the bay in 4 or $4\frac{1}{2}$ fathoms water. Port Salut is formed between a low point on the north and a bluff one with a small eminence along its eastern side on the south. Here is a village, and three rivers run into the sea, one on the north, another at the head, and one in the south part of the bay. To the north-west of the village is a remarkable white cliff, and off it anchorage for small vessels. Two miles N.W. of the white cliff there is a dry sand-bank at half a mile from the shore; and a coral bank with $2\frac{3}{4}$ fathoms water on it lies in front of the village at nearly one mile from the shore.

Gravois point.—From port Salut the shore trends southward to Gravois point, which is thickly wooded and about 60 feet above the sea. It is steep-to, having a depth of 48 fathoms at the distance of one-third of a mile. From Burgos to this point the direct line is about S.E. by E. $\frac{1}{2}$ E., and the distance 33 miles; the coast between forms a bight, and although possessing considerable features, is imperfectly known. It is much exposed to southerly winds, which almost always send in a heavy sea.

Abacou point.—From Gravois point the shore takes an easterly direction for 7 miles and then turns north-east for $1\frac{1}{2}$ miles, rounding and

forming Abacou point, which is low and skirted by a reef which extends about three-quarters of a mile to the E.S.E., but discoloured water extends fully 2 miles to the south-eastward of the point. Several small openings in the reef afford passages for boats, which may be seen at anchor inside. The edge of the reef is well defined by several small rocks showing above water. Although the coast is low between the two points, the land rises at the distance of 4 miles within to 1,080 feet high. The greater part of it is skirted by a reef at the distance of 2 cables, and the edge of soundings is about one mile from the shore, but off the point shallow water extends for nearly 2 miles; thence the bank takes an easterly direction bordering about a mile southward of the island of Vache. Between Gravois and Abacou points there are two small bays called port Nonette and Diablo bay. The first is $3\frac{1}{2}$ miles eastward of Gravois point and affords shelter for coasting vessels from the prevailing winds; a river runs into the sea at its head, and there are several houses on the sandy shore; reefs extend from both points of entrance. Diablo bay is similar to the above, and at its head is a small sandy beach where a rivulet empties itself. The western point is skirted by a reef at the distance of 2 cables.

The Island of Vache* is separated from Abacou point by a channel 3 miles wide, with irregular soundings. The island is about 8 miles in length in a W. by N. and E. by S. direction, and about 2 miles in breadth. Its eastern part is low and thickly wooded; the western portion is composed of small detached hills about 100 feet high, partially cleared of wood, and at the distance of 10 or 12 miles they have the appearance of several small islets. From the east point the south shore runs nearly straight, and is skirted by a reef at the distance of from a quarter to nearly half a mile. Along the eastern portion of the island the soundings are from 4 to 8 fathoms within a quarter of a mile of the reef; but from the middle of the island to the westward the water is shallow, and 3 and $3\frac{1}{2}$ fathoms will be carried along at about half a mile from the shore. There are 6 and 7 fathoms water at a mile south of the Diamond rock, whence it decreases to the shore; the shallow ground will generally be seen.

Diamond point will be known by the rocky islet near it which is moderately high, but it is not easily distinguished, being of the same colour as Diamond point, from which it is distant only 20 feet, and is not recognisable until within the distance of a mile. Diamond point will be better known as being the central of three detached white cliffs, which come in view in the north-west part of Vache island on the vessel clearing Abacou point. Half a mile eastward of the point at the back of the hills there is a lake of

* See Admiralty plan:—Bay of Cayes, No. 476; scale, $m = 1\cdot0$ inch.

salt water. Between Diamond point and the north-west point of the island there are two small bays; the northern one is called Agua; vessels can anchor off these bays or Diamond point in 5 or $5\frac{1}{2}$ fathoms water, sandy bottom, at about one mile from the shore. The best berth is off a sandy shore northward of the point. The north-west point of the island is surrounded by a sand-bank with $1\frac{1}{2}$ fathoms water on it, which extends off 5 cables and as far eastward as the western point of Feret bay.

Feret bay is about three-quarters of a mile eastward of the north-west point of Vache island, and at its eastern point of entrance is the high white islet of Raquette, connected to it by a reef. The bay is small and nearly half a mile across at its entrance, where there are 5 and $5\frac{1}{2}$ fathoms water which diminishes gradually inwards to 2 fathoms. Small vessels in entering the bay should keep midway between the points, and anchor in the middle of the bay, avoiding the white sand-bank with $1\frac{1}{2}$ fathoms on it, easily seen, and which borders the salient points and shores of the bay.

Islets and Reefs.—From Raquette islet eastwards, the north coast of the island is bordered by a white sand-bank with several cays and reefs. The bank extends off about half a mile as far as Rochers point; thence the edge curves to the northward westward of West cay, which is covered with trees, at $1\frac{1}{4}$ miles north-east of Raquette islet; then round a group of islets, the most northern of which is named Agua, covered with thick and bushy trees, and more than 3 miles from Vache. The cays of this group lie close together, and when bearing W.N.W. appear as one; it then trends in the direction of East cay, situated just within the edge of the reef, N. by W. $\frac{3}{4}$ W. 4 miles (approximately) from the east point of Vache island. The cay is small and low, but well marked by a grove of cocoa-nut trees and some fishermen's huts.

About a mile S.S.E. from East cay is a small sand-bank 5 or 6 feet above water, situated also just inside the edge of the reef.

Within the cays, and between the reefs and coral heads, there are navigable veins of deep water, which afford anchorage for small vessels. In coming from the eastward for these anchorages keep to the northward of the cays, and on no account should they be taken without a pilot.

In passing to the eastward of Vache island it is necessary to keep at a distance of 2 miles from the island, and the same distance from the reef, which is steep-to, no anchorage near, and the current set towards it. The mariner should avoid being becalmed in its vicinity.

East reef.—The edge of this reef, extending from the east point of Vache island round the adjacent cays, East and Agua, to the north-west, is tolerably well defined by an almost constant break or ripple, as also by

several small rocks above water. By day the reef may be approached with safety, provided a good look-out be kept, but at night the utmost caution is requisite. No outlying dangers were observed by the *Druid*.

Tides.—The ebb stream sets strongly to the south-eastward over the shoals northward of Vache island.

BAY of CAYES.—From Abacou point the coast bends round 7 or 8 miles to the northward and north-west to the entrance of the river Acul. It then takes a north-east direction for about 7 miles to the town of Cayes, forming the great bay of the same name. All this part of the coast is very low, but backed at a short distance by lofty mountains. To the northward of the point the shore is bordered by a reef which extends off some distance, and several small cays and rocks lie off it; they are named Carénage, Bœuf islet, etc. Nearly midway between the Cayes and the river Acul is the village of Torbec, $1\frac{1}{2}$ miles north-east of which is the village of Vieux bourg, off which is the road of Châteaudin.

The towns of Aux cayes and Jacmel are next to that of cape Haitien in commercial and political importance. Steam vessels of six different lines visit these places monthly. The sailing vessels come chiefly from the United States. All European trade is performed by steam vessels.

Aux cayes has a population of 10,000 inhabitants.

The bay of Cayes terminates to the north-east in the Manchon de Caballon, and to the southward by the island of Vache; the Manchon de Caballon is the west part of the bay of the same name and lies 7 miles to the north of the north-west point of Vache island, and about 3 miles north-east of the town. It is composed of three remarkable white cliffs at the extremity of a hill, which separates two deep ravines on the west side of Caballon bay. About midway between Cayes and the cliffs is the small wooded islet of Compañia, now connected with the main part of the island by a dry reef. The cathedral, which has a low spire surmounted by a globe, bears N.N.W. $\frac{1}{2}$ W. $6\frac{1}{2}$ miles from the north-west point of Vache. The anchorages are safe during the fine season, but in the hurricane season vessels remove to Flamand bay. In all these anchorages wood, water, bread, fresh meat, and vegetables are easily obtained at reasonable prices.

Great reef is an extensive white sand-bank southward of the town, upon which at the north-west and south-east parts are two heads of coral partly uncovered. These banks, extending from abreast Cayes to nearly half-way towards the island of Vache, and along the shore for one mile south-west of Torbec, shelter the anchorages of Châteaudin. A ledge extends from Great reef to the north-west point of Vache island, the depths on which are from $2\frac{1}{2}$ to 5 fathoms.

The inner anchorage of Cayes is very limited, has only about 13 feet water, and difficult to enter or leave. That of Châteaudin is separated from it by a narrow tongue of white sand, which leaves the shore and joins the northern part of the Great reef; small vessels pass over it from one anchorage to the other. The Châteaudin anchorage is well sheltered, and extends from Principe point, west of the village of Torbec, as far as Châteaudin point. The soundings diminish regularly from $4\frac{1}{2}$ fathoms at its southern part to $2\frac{3}{4}$ fathoms near the tongue of sand separating the two anchorages, and as the shore or reef is approached.

The entrance to Châteaudin road, between the west end of Great reef and Maho point, is about half a mile in breadth and carries 15 feet water. Vessels anchor in about 17 feet, sand and mud, at half a mile from the shore off the village of Torbec or that of Vieux bourg. Those of large tonnage anchor in 7 or 8 fathoms southward of Compañia islet.

Etron-du-Porc.—In the middle of Cayes bay, and nearly midway between the north-west point of Vache island and the western shore of the bay, is a dangerous small rocky shoal, awash, called Etron-du-Porc. It lies W. $\frac{1}{4}$ N. distant $3\frac{1}{2}$ miles from the north-west point of Vache island; North from the eastern extremity of the cay nearest Abacou point; and S. by W. $\frac{1}{2}$ W. from the middle of the town of Cayes. This shoal has 4 fathoms water close to. Vessels should pass eastward of it.

Mella bank, to the northward of the cays and sand-banks which border the north coast of Vache island, consists of four shoals lying between the meridian of Toulau point (the eastern point of the entrance to Flamand bay) and that of Boyet point (the eastern point of the entrance to Meste bay). They are all of small extent, steep-to, and when the sun is shining brightly may be seen from aloft. It is probable that the bank is still changing. The outer shoal is about $1\frac{1}{4}$ miles from the shore.

The western shoal has a depth of 12 feet and lies S.E. $\frac{1}{4}$ S., nearly a mile from Toulau point, and S.W. by W. $\frac{1}{2}$ W. from Boyet point.

The other three shoals lie within three-quarters of a mile of each other. The middle and largest is nearly circular, about a quarter of a mile in diameter, has 6 feet on its shoalest part, and bears from Boyet point S. by W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles distant, and from Toulau point E.S.E. The remaining two, with 12 feet water, bear E.N.E. and N.W. $\frac{1}{2}$ N., 3 cables from the largest shoal.

By keeping $1\frac{1}{2}$ miles off shore a vessel will pass in 7 fathoms clear of all dangers, no shoals nor rocks having been found south of this limit. Passing half a mile outside the line of the headlands will lead through the channel between Mella bank and the main, but in using this channel the lead should be kept constantly going as the soundings are very irregular.

Pilots.—As Cayes bay is not well known, a stranger should have the assistance of a pilot, but as the pilots are not well acquainted with the locality, too much confidence should not be placed in them. The signal should be made as soon as possible, and if necessary a vessel can anchor northward of Diamond point at the west end of Vache island. The cost for a pilot in 1864 was about 1*l.* sterling.

The Winds in Cayes bay are pretty regular. The land wind comes off from the north-west, and veers round gradually to the north-east until about noon, when the sea breeze sets in from the south-east and veers to the south towards evening.

Directions.—The anchorages in Cayes bay may be approached by the channel eastward of Vache island, or by that between the island and Abacou point. In taking the latter channel, run down the south and west sides of Vache island. The soundings between Lataniers and Diamond points are irregular, and in proceeding to the anchorages off the north-west part of Vache island, it will be prudent to keep at least $1\frac{1}{2}$ miles off shore, giving point Lataniers a good berth, and not coming into less than 5 fathoms until abreast the north-west point; then haul up eastward of Great reef, which should be seen on the port bow and a wide berth given to it, avoiding also the shoal patches in the channel.

Lataniers point, the south-west extreme of Vache island, is low and thickly wooded. Shoal water extends a considerable distance to the south-west of the point. H.M.S. *Druid* rounded the point at a distance of $1\frac{1}{2}$ miles, the soundings varying between $5\frac{1}{2}$ and 10 fathoms: half a mile inshore of the vessel the water appeared to be much shoaler.

If a vessel cannot enter the inner anchorage on account of her draught, steer for Caballon cliffs and anchor to the southward of Compañia islet, with Battery point at the east end of the town bearing about West. Observe, however, that at $1\frac{1}{2}$ cables to the south-east of the point of the cliffs there is a shoal* of about a quarter of a mile in length east and west, and $1\frac{1}{2}$ cables in breadth, with 6 feet water on it and 8 fathoms within it, and the vessel will ride here exposed to the south-east. Nearer the town there is good anchorage southward of Battery point in from 5 to 8 fathoms water, but the patch of 22 feet should be avoided. There is also a coral patch of $2\frac{1}{4}$ fathoms, S.E. $\frac{3}{4}$ E. three-quarters of a mile from Battery point, which is readily distinguished by its fortifications, and is well clear of the houses in the eastern part of the town. There is a hut on this point, and also one on the western side of the entrance to L'Ilet river.

As a pilot should be taken for the inner anchorage (said to be shoaling), the channel through the reef being only about a cable wide, the usual signal had better be made as soon as possible. In this route the depth will

* This shoal is not marked on Admiralty plan 476; its existence seems doubtful.

be from 3 to 4 fathoms, irregular soundings, and the bottom will be visible until the depth is 6 fathoms, when it is lost sight of, and the water becomes a light green.

Western channel to Cayes.—The above-mentioned western channel to Cayes through the bay of Cayes and between the north-west part of Vache island and Great reef, is not used by large vessels. Shoals other than these shown on the plan are reported to have grown up, and the water generally to have shoaled. Several steam vessels having grounded, this route is only used now by small vessels; the eastern channel is generally preferred.

If the anchorage in Châteaudin road is preferred, having brought the north-west point of Vache island to bear S.E. by E. $\frac{3}{4}$ E. about 2 miles distant, steer N.W. by W. $\frac{3}{4}$ W., which course will lead about a mile northward of Etron-du-Porc, and towards Maho point, in from 5 to 8 fathoms water; on nearing the latter a beacon* with a *white* flag on it, at the south-west end of Great reef, should be sighted, which must be left to the eastward. Having rounded the reef, which is easily seen, haul up along shore, keeping in from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water, and anchor a little eastward of Vieux bourg.

Route from the Eastward.—Approaching Cayes bay from the eastward, close the coast near morne Rouge point (which may be known by five white cliffs) and steer along the land, southward of the small outlying cays, and northward of those extending off Vache island; when westward of Orange cay, close the northern shore to the distance of 2 miles; and when westward of Pascal point, the west extreme of St. Louis bay, bring the town of Cayes to bear West or a little northward, and steer for it as far as Compañia islet, avoiding on the north the Mella bank. From the eastward this route is the most direct.

Vessels from the westward, after passing Lataniers point, should keep one mile from the south side of Vache island, in which route no bottom at 10 fathoms will be found. Round the east point of Vache island at a mile distant, and when it bears West steer North for Orange cay. When the north point of Agua cay comes in line with East cay bearing W.N.W., alter course to N.N.W., keeping some white cliffs in little Meste bay on starboard bow: continue this course until East cay comes in line with the north-west extreme of Vache island W. by S., then alter course to W.N.W. On this course the first soundings with the hand lead will be obtained in 10 fathoms, which will be carried varying 1 or 2 fathoms, until the east extreme of Agua cay bears S.W.; the water, however, is so clear that it appears much shoaler.

* This beacon is not to be depended on.

If from the southward, steer 2 or 3 miles eastward of Vache island, and bear in mind that the current sets strong towards it and the eastern reefs. When at the above distance from the island, steer about N.N.E. until the large Agua cay bears W. $\frac{1}{2}$ S.; gradually round it at the distance of 2 miles, and keep about W.N.W. until Great reef is seen, then steer for the anchorage. In this route, to the northward of large Agua cay soundings will be from 15 to 22 fathoms, decreasing rapidly but irregularly as the Great reef is approached to 8 and 7 fathoms.

Anchorage.—When the north extreme of Agua cay comes in line with the north-west point of Vache island S.E. by S., a course W. by N. should lead a vessel clear of Great reef to the anchorage. A good berth will be found in 7 fathoms, sand, with the white cliff just open south of Compañia islet N. 47° E., Battery point, N. 15° W., and Consul's house N. 69° W.

In proceeding to the eastward from Cayes anchorage, steer E. by S., and when East cay bears South, a course to the southward and eastward may be shaped.

Caution.—Several shoal heads have been reported in Cayes anchorage. H.M.S. *Druid* passed close to and over some dark patches, and, with the exception of one, found the discolouration to be caused by dark weeds growing on the bottom; 5 fathoms was the least water obtained. It will be prudent, however, to avoid the dark patches as much as possible.

Leaving this anchorage, a vessel should stand eastward until the white cliffs of Caballon bear about N. by E.; then steer for* Vache island, taking care not to bring the white cliffs eastward of that bearing; when the town of Cayes bears N.W., a vessel will be southward of Great reef, and the channel may be steered for. In beating out of the bay the western shore southward of Acul river is free from danger, and there are from 7 to 10 fathoms water at three-quarters of a mile from it. Do not stand nearer Etron-du-Porc than 7 fathoms. The shoal patches do not always show, but a good look-out should be kept for them and the lead going.

Caballon bay, about 3 miles eastward of Cayes, lies between Caballon cliffs and Carénage islet. The shoal† off the cliffs has already been noticed, and nearly in the centre of the entrance of the bay there is another, with $2\frac{1}{4}$ fathoms on it, and which extends 3 cables north-east and south-west and about a cable in breadth; it may be passed on either side. The west side of the bay is steep and rocky; the best anchorage is on the

* This channel is not now used. See page 278.

† See note page 277.

east side, close up under the mangrove trees, where the depth of 5 fathoms will be found almost touching the shore, Carénage islet sheltering it from the south-east. Water may be obtained some little distance up the river Caballon, that flows into the bay.

Flamand bay,* $1\frac{1}{2}$ miles eastward of Caballon bay, is a narrow inlet $2\frac{1}{2}$ miles in length in a N.E. by N. direction, and nearly half a mile in breadth. The south side of Carénage islet is foul to the distance of 3 cables, and the east side of the entrance from Toulau point to the inner point, a mile northward of it, should not be approached within a cable. The inner point is also foul on its north side, and between it and the opposite shore the channel is not more than a quarter of a mile wide. Within this the depth gradually decreases from $4\frac{1}{2}$ to 2 fathoms, towards the head of the inlet, the bottom is everywhere mud, and the inner part is so well sheltered that small vessels moor in it during the hurricane season.

As this inlet runs so far in, the temperature is very high and the musquitos unbearable until the end of September. The tide rises about 3 feet.

Meste bay,† 2 miles eastward of Flamand bay, is three-quarters of a mile wide in the narrowest part and 2 miles deep; it is capable of receiving vessels of the heaviest draught, there being 5 and 6 fathoms water at its inner part; the holding ground is good, but it is open to the southward. Nearly in front of the entrance, however, and about $1\frac{1}{2}$ miles from the shore, is the Mella bank (page 276). It is necessary to pass round the east or west end of the bank to enter the bay.

The eastern entrance to the bay is about three-quarters of a mile wide, and lies between the Almacenes cays, near the west side of entrance to little Meste bay and the east end of the bank south of them. The western entrance is half a mile wide, and formed between Toulau point and the west end of the bank south of it. To enter by the western passage, the coast between Paulino point (half a mile eastward of Toulau point) and St. Rom point at the west side of entrance to the bay, should be kept aboard; then keep mid-channel into the bay. The soundings diminish gradually from 13 to $1\frac{1}{4}$ fathoms water near the mouth of the river at the head of the bay.

Little Meste bay, about 2 miles to the eastward of the Great bay, is merely a small inlet, about a quarter of a mile wide and a mile deep; it is open to the southward, has good holding ground in from 4 to 6 fathoms water, and the shores are bold.

* See Admiralty plan :—Flamand bay, No. 476; scale, $m = 1\cdot0$ inches.

† See Admiralty plan :—St. Louis and Meste bays, No. 476; scale, $m = 1\cdot0$ inches.

St. Louis bay,* about $1\frac{1}{4}$ miles eastward of the above, between Pascal and Bonita points, is about $1\frac{1}{2}$ miles wide at the entrance, and affords excellent anchorage. It is open to the south, but to the south-east it is protected by some small cays; the two outermost and largest of these, called Mosquito and Orange, lie about a mile from the shore, and are three-quarters of a mile apart. On the west end of Orange cay are two remarkable hillocks 40 and 80 feet high, which are seen from the town of Cayes just clear of the intermediate points; the eastern extremity of Vache island bears from them about S. $\frac{1}{2}$ W. Within them are the small cays of Rat and Taigneuse, and close to the shore, at three-quarters of a mile eastward of Bonita point, is Henri islet.

The town of St. Louis stands in the north-east corner of the bay, and about half a mile south-west of it there is a large rock, on which stands fort St. Louis; and about a quarter of a mile to the north-west of St. Louis, on a low point, is another fort. In St. Louis bay, from September to March the wind is from E.N.E., and from March to September from S.E. In March it sometimes blows late from this last direction. Near the coast westward of St. Louis the wind is N.E. or East; when at the same time it blows from S.E. northward of cape Tiburon.

Directions.—The entrance to St. Louis bay lies westward of Orange cay, between it and Pascal point, $1\frac{1}{4}$ miles distant. In running in, borrow towards the shore, leaving to the eastward a small dry sand-bank lying nearly in mid-channel off Pascal point. Having passed within this, haul into the bay and anchor in 7 fathoms water, at about 3 cables westward of fort St. Louis; or a vessel may pass between the fort and the main to an inshore berth off the town, according to her draught. In the channel the depths are 4 and 5 fathoms. Should the east side of the bay be preferred to anchor on, be careful to avoid a small patch with $2\frac{1}{2}$ fathoms water on it, lying three-quarters of a mile S.E. by S. from fort St. Louis. In a case of necessity the bay may be entered from the eastward by passing northward of Mosquito cay, and close on the north side of Rat islet, and between it and Taigneuse cay. This channel, however, is very narrow, and there are many shoals between Rat islet and Bonita point. The south sides of Mosquito and Orange cays are steep-to, and there are from 17 to 20 fathoms within half a mile of them.

Ramier or Pigeon cay† lies about 2 miles E. by N. from Mosquito cay, and, although narrow, is about three-quarters of a mile long

* See Admiralty plan :—St. Louis and Meste bays, No. 476; scale, $m = 1.0$ inches.

† See Admiralty plan :—Aquin bay, No. 474; scale, $m = 1.4$ inches, which must be used with caution, doubts having been thrown on its correctness. (H.M.S. *Dryad*, 1875.)

east and west. There are on its south side three sand cliffs 25 feet high.* A small cay lies a quarter of a mile from its west end, connected to it by a beach of sand and coral; from the west side of which a reef extends W. $\frac{1}{2}$ S. for nearly half a mile with five fathoms water at its outer edge. A coral patch, called the Kansas reefs, with from 4 feet to 5 fathoms water on it, lies S.W. $\frac{3}{4}$ W., $1\frac{8}{10}$ miles from the east end of Ramier cay; it is about half a mile in extent, and generally breaks with 9 and 10 fathoms close to its edge: about three-quarters of a mile N.W. of this shoal, and $1\frac{1}{2}$ miles S.W. by W. $\frac{1}{2}$ W. from the small cay, is a small coral head, with only 2 fathoms on it and deep water all round.

Breakers and shoal patches with from 4 to 5 fathoms on them are shown on Plan 476 as lying east $1\frac{1}{4}$ miles, S.E. $1\frac{1}{2}$ miles, and E. by N three-quarters of a mile from Kansas reefs.

Regalle cay, one mile E.S.E. of Ramier, is a small bushy islet surrounded by a sand-bank to the distance of about a cable; one mile N. by W. of Regalle cay, and the same distance N.E. $\frac{1}{2}$ E. from Ramier, is a small islet just above the level of the sea, called Anguille or Eel cay.

Grosse or Aquin cay, the largest of the group, lies one mile eastward of Anguille, and is 2 miles long east and west, and from a half to one mile in breadth: its north side is very irregular. It may be recognised by two remarkable white hills, from 300 to 500 feet high, and four white cliffs on its southern side. It is bold and steep-to on all sides.

Diamond rock is a small white rocky islet half a mile eastward of Grosse cay, nearly in the middle of the eastern channel into Aquin bay, and about 3 cables westward of Morne Rouge point. The rock is bold on all sides but the north, whence a narrow ledge runs off a long half mile to the N.N.W.

Morne Rouge point is of considerable elevation, and at some distance off appears a bold headland, but as it is approached it becomes known by five remarkable white hummocks near its extremity. The mountains near it rise to the height of about 1,000 feet. In a little bay on the east side of the point a small rock will be seen called False diamond. At a short distance from the point there are 10 and 11 fathoms water.

Aquin bay.—From cape St. George, abreast of Mosquito cay, to morne Rouge point, the distance is about 8 miles, and the cays just described lie from one to 3 miles from the shore, which they partly shelter. The western portion of this bight is called English bay. Aquin bay is the name given to the eastern portion, in which there are $3\frac{1}{2}$ and 4 fathoms water, and where vessels of light draught will find security against any wind.

* These sand cliffs make very like chalk cliffs.—Navigating officer, H.M.S. *Fantome*, 1885.

There are clear channels leading into the bay between most of the cays. That to the eastward of the Diamond rock carries a depth of 4 or $4\frac{1}{2}$ fathoms; but it is very narrow, the wind baffles under Morne Rouge point, and is apt to throw a vessel on the Diamond ledge. On the west side of the Diamond a vessel will carry $5\frac{1}{2}$ fathoms through, and have much more room. The channel between Grosse and Anguille cays is very good, as the former cay is steep-to. That between Anguille and Ramier is also deep and clear; but if a vessel has to pass westward of Regalle, the Kansas reefs $1\frac{1}{4}$ miles south-westward of Ramier are in the way, so it had better be avoided. A patch of $2\frac{1}{2}$ fathoms, or less, lies in the channel northward of Grosse cay, between it and an extensive bank which projects half a mile from the main; at the west end of this bank is a cay called Trompeuse. The north-east side of Grosse cay is foul for 2 cables.

The opening between Ramier and cape St George is free of danger, but be careful to avoid the Ramier shoal and Kansas reefs. Vessels of large tonnage may anchor in English bay, with good holding ground, but it is not so well sheltered as Aquin bay; the best channel is between Grosse and Anguille cays.

The soundings outside the cays are very irregular; the depth at a long half mile southward of Ramier shoal or $1\frac{3}{4}$ miles from that cay is only 4 fathoms, and they should be given a berth of 3 miles during the night.

Coast.—All the projecting points and headlands on this part of the island are bold and steep-to. The white cliffs and hills resembling chalk are very remarkable; the easternmost, and most elevated, called the hummocks of Aquin, form the Morne Rouge point, and cannot be mistaken. From the latter point the shore takes an E. by S. direction for 36 miles to cape Baienet, and becomes so straight, bold, and steep-to, as to receive the name of the Iron coast. It affords no shelter whatever against the sea breeze, and the edge of soundings is about $1\frac{1}{2}$ miles off the coast. About 6 miles westward of cape Baienet there are some high cliffs, and near them a small rocky islet. In the above space are several small bays, but they are of no importance.

Current.—When proceeding from Jacmel harbour to bay of Cayes in January, a current was experienced in the *Druid* setting to the eastward at the rate of a knot an hour.

East Flamand bay.—To the eastward of morne Rouge point is East Flamand bay, formed between it and Flamand point on the east; it is open to the southward and affords no shelter. From Flamand point a reef extends a mile to the southward, and on its west side there is shelter from easterly winds for small vessels. In this bay there are 7 to 11 fathoms water, shoaling gradually to the shore.

Cape Baienet may be readily distinguished by the white hillocks which overlook the cliffs that form the shore, and is the south point of a small bay of that name, at the head of which there is a little village. The bay is quite exposed to the east ; there is no regular landing, and a heavy sea sets in on the beach.

From this to cape Jacmel the shore trends E. $\frac{3}{4}$ N. 10 miles ; there are several small bays between, but no shelter whatever.

A conspicuous white rock lies about 2 miles west of cape Jacmel, and is an excellent distinguishing mark when approaching Jacmel harbour from the southward.

JACMEL HARBOUR,* or more properly bay, between capes Jacmel and Maréchaux, N.E. by N. and S.W. by S. from each other, about 2 miles apart, is 2 miles deep and open to the south-east. The latter cape is a long flat strip of table-land about $1\frac{1}{2}$ miles in extent, terminating in a bold bluff about 100 feet high, and steep-to. At the distance of one mile from it there is no bottom with 150 fathoms.

The town of Jacmel stands in the north-east corner of the bay on the east side of the river of the same name, which forces itself through several openings in the sandy beach at the head of the bay ; a dry spit of sand and shingle, about 2 cables long, has formed across the mouths of the river (*Gauche*), the water of which finds an outlet round the west end of the spit ; on the western side of the bay are two remarkable white cliffs. In the centre of the bay no bottom will be found with 80 fathoms, and the narrow strip of soundings which skirt the shore at the distance of from a quarter to half a mile is steep-to. At a quarter of a mile southward of the town a shallow rocky half flat runs off nearly half a mile.

Jacmel is open to foreign trade. The chief exports are coffee, cocoa, logwood, and mahogany ; 55 British steamers called here in 1881.

Water.—The watering place is on the western side of the bay, near a brown spot in the land between the two cliffs. Wood it not easily obtained, but there is a dépôt for coals.

The steam vessels of the West India Mail Company calls at Jacmel twice a month.

Supplies of coal cannot be depended upon here, but water and other supplies are plentiful.

Directions.—From an offing to the eastward the locality of Jacmel is pointed out by a deep notch in the mountain range which over-

* See Admiralty plan :—Jacmel harbour, No. 473, scale, $m = 3$ inches, which, not being a complete survey, must be used with caution.

tops the less elevated ridge of hills on the shore near cape Maréchaux. Should the notch be obscured, which is frequently the case, it may be known by a remarkable point to the eastward of Maréchaux, near which is a white rock named Belle-roche. Having passed cape Maréchaux, the bay will open out (the most conspicuous object in the town is the new cathedral, with its two red-topped minarets, it is to the westward of the citadel), when haul gradually in, taking care not to bring the northern white cliff to the southward of West, until the anchoring mark comes on, the wharf and a flagstaff in the town in line N.N.E., to avoid the eastern ledge; the best anchorage will be found just westward of the above line, but the edge of the bank is so abrupt, that there will scarcely be time for a second cast of the lead; shoot in therefore very cautiously under easy sail, and be prepared to anchor the moment soundings are obtained. A heavy swell generally rolls into the bay, and with light winds caution is requisite to avoid being becalmed. With the land wind this may be avoided by keeping the valley open. The breezes are generally very regular. The rise of tide is about 3 feet.

Anchorage.—The anchorage space in Jacmel harbour is so limited, that when more than one vessel is lying off the town it is necessary to lay out a kedge, to avoid fouling when the land wind comes off. A small pier has been built close westward of the wharf.

The leading mark for the anchorage is the citadel flagstaff in line with the centre of the pier bearing N. 34° E.

A pilot may be obtained, but his services are scarcely necessary; the plan of the bay may be somewhat incorrect, as the banks are said to have undergone considerable change.

Banique bay.—The coast from cape Maréchaux to Soye point at 4 miles eastward, is composed of high cliffs, and between are the small bays of Arnaud and Fontaine. Soye point is long, narrow, and terminates in cliffs. To the eastward of it is Banique bay, at the head of which the Normands rivulet runs into the sea. From Fournier point, the western extremity of the bay, a reef skirts the shore at 1½ miles off as far eastward as Marigot point, a distance of 10 miles. There are several openings in the reef through which small vessels can pass. The principal one leads into Sauzay bay, formed between Fournier and Belle-roche points, and in front of which is a small islet.

Cayes Jacmel.—The anchorage of Cayes Jacmel, at 2 miles eastward of the village of the same name, affords but little shelter and is fit only for coasting vessels. The village of Cayes Jacmel stands near the shore at a mile eastward of Belle-roche point, and on the right bank of a small river of the same name. The anchorage extends 2 miles east and west, and nearly three-quarters of a mile in breadth. The reefs and sand-

banks are easily seen when the sun will admit. The entrance is open to the southward, and half a mile in breadth between the reefs and white sand-banks which border the interior. Having entered, steer westward and anchor eastward of the village. To the eastward or westward there is some shelter from the sea from the southward, which is generally very heavy. There are several sandy beaches on the shore.

Morne Rouge.—From cape Maréchaux the coast takes nearly an East direction for 17 miles to morne Rouge, which may be recognised by several high white cliffs 4 miles in extent, having at their west end a remarkable square red cliff; it is also known by two hummocks on it. The shore is all along so steep, and in some places foul, that with light baffling winds, which are generally accompanied by a heavy swell, sailing vessels had better give it a wide berth. The edge of the bank lies about $1\frac{1}{4}$ miles from the shore; the depths are 19 and 20 fathoms, coral crust, a mile distant, and 3 fathoms close to the beach. At 5 miles eastward of the cliff soundings extend off 3 miles from the land.*

Orange and Coutelas bays.—Immediately eastward of morne Rouge is Orange bay, which terminates to the east at the point of the same name, formed, like the preceding ones, by high white cliffs. There is no beach in this bay, but a small islet lies in the middle of it, named Patira.

Between Orange point and Colombier point, near which is a large rock of the same name, is the bay of Coutelas. It is 3 miles in breadth and surrounded by high cliffs. In front of it the bank begins to extend; and at $1\frac{1}{2}$ miles from the land there are 16 to 18 fathoms water, and near the shore 2 fathoms, coral bottom.

River Salée bay.—Three miles farther eastward is Salée bay, the western point of which is broad, round, cliffy, and commanded by a conical hill. At the head of the bay a river empties itself on a shore of sand and pebbles.

Sale-Trou.—Boca Chica point, at the western extremity of this bay, is composed of high white cliffs, which extend westward for $3\frac{1}{4}$ miles at from 500 to 700 feet above the sea. These heights are backed by a chain of mountains which reach, about N.N.W. of Sale-trou, an elevation of about 8,000 feet. Predicador, the eastern point of the bay, is low, and at half a mile eastward of it is a small islet, very near the coast and seen with difficulty.

The extreme points of the bay are 2 miles apart, and in the north-west angle is the town of Sale-trou. A large beach of coarse gravel terminates to the eastward at a small red cliff, called Tapion, which from the offing appears conspicuous; at half a mile eastward of the red cliff a river

* Capt. R. Owen, R.N.

empties itself. Vessels of not more than 15 feet draught can anchor off the town, over sand and mud. Large vessels should anchor at about a mile from the shore in 7 or 8 fathoms water, but here the holding ground is not so good. This anchorage is about $17\frac{1}{2}$ miles eastward of the morne Rouge, open to the southward, and dangerous during the summer months.

Coast.—From the village of Sale-trou the shore trends to the south-east for about 12 miles to the mouth of the river Pedernales; between are the small bays of Bœuf, Grands-gosiers, Cochon, Raccroc, and Piéges. At the distance of 5 miles from Sale-trou there is a remarkable white triangular cliff, 220 feet high, and the coast all along is composed of white cliffs over a stony beach. Off the point, at half a mile southward of the white triangular cliff, and about a quarter of a mile from the shore, lies a ledge of rocks above water. Thence the coast for 3 miles forms a bay about three-quarters of a mile deep, and at half a mile north of its south extreme is the eastern white cliff. From this bay a remarkable range of red rocks follows to the south-east for about 3 miles farther to Pedernales point, northward of the mouth of the river of the same name.

The bank of soundings borders this part of the coast at variable distances. To the southward of Sale-trou it extends off about 2 miles with irregular depths of 7 to 25 fathoms; but abreast the range of red rocks and the mouth of the Pedernales it extends 5 miles to the south-west, with 25 fathoms at this distance, whilst at cape Rojo the edge is not more than $1\frac{1}{2}$ miles off.

The Perdenales or Pitre river is a considerable stream, separating the Haïtian portion of San Domingo from the Dominican, and its entrance is easily recognised.

Pedernales or Pitre bays.—Pedernales point is of moderate elevation, and the north extreme of two bays of the same name; the south point is commanded by some table-land which is known by the name of the Platform.

There is anchorage off the low and flat land of the northern bay, or southward of the western point of entrance to the river, where excellent water may be obtained. The anchorage is easy of access, and there are no dangers. The coast in the neighbourhood of Perdenales bays is formed of cliffs of a chalky substance interspersed by some beaches of coarse gravel. In these bays, as on the coast as far as cape False, there is shelter from the ordinary winds, but exposed to those from the south and west.

Trou Jacob is formed between Platform point and cape Rojo. A river empties itself into the bay. There is anchorage sheltered from the

prevailing winds in from 7 to 3 fathoms, coral and sand, N.N.W. or N.W. by N. $2\frac{1}{2}$ miles from the cape. The edge of soundings immediately north-west of the cape is only about a mile off, but its contour is serpentine, and beyond 2 miles in the same direction the bank extends off nearly 4 miles from the shore, with $4\frac{1}{2}$ to 12 fathoms water on it. At one mile westward of the cape there are from 11 to 20 fathoms water.

Cape Rojo (Raxo) lies 9 miles about S.E. by S. from the mouth of the Pedernales river, and is the northern extremity of a cliff about 40 feet high and 2 miles in length north and south.

Rousselle bay, to the southward of cape Rojo, has a large beach of coarse sand and gravel in front of the high cliffs which encircle it, and a river of the same name runs into the bay. A vessel may anchor here in 11 to 8 fathoms water, at $1\frac{1}{2}$ miles from the shore, sheltered from North round by east to South, but⁷ exposed to westerly winds. This bay is separated from that of Anguilas by a cliff 2 miles in length, called Agujas.

Anguilas bay is $2\frac{1}{2}$ miles wide and $1\frac{1}{2}$ miles deep, with a large beach of coarse sand and gravel, behind which, as in Rousselle bay, rises steep cliffs of moderate height. The depth varies from 12 to 8 fathoms, which diminishes to $2\frac{1}{2}$ fathoms near the shore. The bay affords good shelter from easterly winds, but exposed to those from the westward. Anchorage will be found in $7\frac{1}{2}$ or 8 fathoms water, sand, at about midway, and a little within the line from the south point of Agujas cliff to Chimahé point, the south extreme of the bay; also at one mile to the N.N.W. of Chimahé point in 8 or 9 fathoms.

Thomas bay.—From Chimahé point the coast takes a south-westerly direction as far as cape False, forming this bay; anchorage will be found in the middle of it sheltered from the winds as far round as S.W. in from 8 to $5\frac{1}{2}$ fathoms water, which diminishes gradually to the shore at the foot of the high cliffs which entirely surround it.*

Cape False, 135 feet high, is the extremity of a long headland running east and west, and lies 8 miles south of cape Rojo. To the southward of cape False the land trends to the E.S.E., moderately elevated and level, and between it and Beata point there are three small bays where, in case of necessity, small vessels may anchor in from 8 to 11 feet water. To the eastward of Burgeaux bay, the western of the three, a white sand-bank commences and borders the shore as far as Beata point, where the island of the same name is connected to the coast by a narrow ridge of rocks, over the middle of which there are from $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms water.

* H.M.S. *Griffon* anchored here in 1883 and found it a safe and convenient anchorage.

Beata point is the southern extreme of San Domingo, and terminates to the south in two salient points forming a small bay. This part of the coast presents a white rocky abrupt plateau, about 40 feet high, in which are large gaps and crevices. On one of the points there is a small hillock. The south point of San Domingo has, 2 miles from or N.E. of its extremity, a rocky coin-shaped hillock, which, seen from a distance of 10 miles on a north-easterly bearing, has the appearance of an island, and then much resembles Alta Vela. The south-west part of the point is long, low, and clifty; off its extremity is a small rock. The small bay between the points does not afford shelter from the prevailing winds; its shore appears steep-to, with very little beach. The rocks and cliffs in the bay are much whiter than those to the north-east of Beata point. For 4 or 5 miles to the northward of the point, the coast viewed either from the east or west appears as a low promontory extending from the foot of the Bauruco mountains, and rising in the centre to a height of 80 or 90 feet; the surface is covered with a low thick scrub. The coast line to the north-east is of dark low cliffs.

Between cape Rojo (Raxo) on the north and Beata point on the south, the coast in all its extent is a continuation of vertical cliffs, which give a special character to the bays formed on this portion of it. These cliffs project and recede from the sea, forming bays between their points, but still preserving their vertical character behind a shore of sand and pebbles, which is generally very narrow, so that it is necessary to climb the cliffs or seek a break in them if requiring to get inland. The bays present the same character as well, and this peculiar feature strikingly prevails on that part of the coast immediately west of Beata point. The same feature is found on the western and southern coasts of Beata island, where there are two ranges of cliffs, one rising over the beach, the other higher and farther inland, which are very distinct. The old French description of the island generally gives the name of *acculs* to the bays of this class, because when on shore one is hemmed in without being able, except with difficulty, to reach the summit of the cliffs.

Current.—On the north side of the great bight between cape False and Jacmel, the current has frequently been found setting strong to the eastward, and consequently of great advantage to vessels bound to windward, but to the southward of cape False the direction is generally strong to the westward.

Frayle rock lies N. by W. $\frac{3}{4}$ W. $9\frac{1}{4}$ miles from Alta Vela, West 10 miles from the north end of Beata island, and S. $\frac{1}{4}$ E. $8\frac{1}{4}$ miles from cape False. It is about half a cable in extent, and 50 feet high, and at a

distance has the appearance of a cluster of sharp peaked rugged rocks, with white tops. It is steep-to, having 17 fathoms at a cable off.*

Beata island.—The north point of this island bears W. by N. 4 miles from Beata point, and S.E. $\frac{1}{4}$ E. 13 miles from cape False. It is about 5 miles long north and south, 2 miles broad, mostly covered with brushwood, and from 50 to 80 feet high. The southern part is the most elevated. The south coast is about 40 or 50 feet high, steep and rocky. The south-west point is of a similar bold nature, but is lower. The north end terminates in a long low point, and not far from it there is a solitary hut. The west side trends about N. by E. $\frac{1}{2}$ E., is bold and steep-to, and off some parts of this side there is no bottom with 130 fathoms of line, at three-quarters of a mile from the shore; and off others a depth of 20 fathoms, nearly a mile distant. From the south-west point a ledge stretches off some distance in that direction; discoloured water extends W.S.W. of this point a distance of 2 miles. H.M.S. *Druid* passed a cable southward of this discoloured water, and had no bottom at 12 fathoms, and there are only 4 fathoms water at 3 cables off. The east side is very steep; it extends N.E. and S.W., rising towards the south. The south-east point is a steep bluff having some small rocks off it, but the north and north-east sides are connected to Beata point by a shallow white bank, on which the greatest depth is reported to be 3 fathoms. N. by E. of the island there is a breaker.

Anchorage.—Good anchorage will be found in from 7 to 9 fathoms water, at about half a mile from the shore, with the north point of the island E. by N. $\frac{3}{4}$ N., and Alta Vela, S.W. by S. In 1883 H.M.S. *Griffon* found good anchorage with the N.W. point bearing N.E. by E. $\frac{1}{4}$ E. and a remarkable red rock in line with the south extreme of the island (the rock is about 60 feet high); a shallow spit runs off the N.W. point which can be plainly seen. Fish is said to be plentiful; there are wild goats and boars on the island; the sea breeze blows with a force from 5 to 8.

Alta Vela (the high sail) lies S.W. $\frac{1}{2}$ W. $6\frac{1}{4}$ miles from the south-west part of Beata island. It is three-quarters of a mile long in a N.N.E. and S.S.W. direction, and half a mile wide, and is almost entirely composed of a remarkable bell-shaped hill, the summit of which is 500 feet above the sea. At three-quarters of a mile north from the north side there is a small low flat black rock about 100 yards in length and 20 feet high; and a coral bank of soundings varying from 15 to 18 fathoms, stretches off $1\frac{1}{2}$ miles from the south-east,† and about one mile from the south-west side. The

* Capt. R. Owen, R.N.

† H.M.S. *Tourmaline* in 1878 found 12 fathoms with Alta Vela West, and the east extreme of Beata island N. by E.

shores are rocky, but may be approached with safety. There is anchorage in from 7 to 11 fathoms, coral, off the wharf at the north-west side of the island, with the flagstaff bearing about E. by N. distant nearly half a mile. The veins of phosphates of lime and alumina on the island are being worked by a company. Vessels bound either east or west will find Alta Vela a most valuable point of departure.*

Beata channels.—The channel between the islands of Alta Vela and Beata is clear. In passing through this channel H.M.S. *Druid* rounded the south-east point of Beata island at a distance of one mile, preserving that distance on passing the south side of the island. With the south-east point bearing North, the *Druid* had soundings of 17 fathoms, coral, carrying thence 11 to 13 fathoms, until the south-west point (of Beata island) bore N. by E., when the water deepened suddenly to 17. Half a mile off the S.W. point H.M.S. *Griffon* had 7 fathoms, and 13 at half a mile off the south point, but it will be prudent to keep outside all. That northward of Beata island is navigable for vessels of light draught, but the depth is less than 3 fathoms, and the swell is generally very heavy. To the northward and westward of the north part of Beata island are five small rocky islets, the northernmost of which bear N. 15° W. from the north-east point of the island, distant 2 miles (approximately).

Directions.—To navigate the inner channel from the westward, steer S.E. by E. from cape False, keeping it and another point to the eastward of it nearly in one. As Beata island is approached, the sudden change in the colour of the water will show distinctly the bank running off from both shores; when steer in mid-channel. The eye will be the best guide, as all the shoals are easily seen from aloft. When abreast of Beata point the water will darken and deepen, and the effects of the easterly swell will be felt.

Cape Mongon.—From Beata point the shore trends to the north-east. From the north-eastern part of the low land forming the southern extreme of San Domingo the coast line changes to high precipitous ground, occasionally forming low cliffs near the sea, and at the distance of 17 miles is cape Mongon, a bold promontory of considerable elevation, and which at the distance of 15 or 18 miles has the appearance of an island. In the interior will be seen the lofty mountains of Bauruco, which rise to the height of 2,400 feet.

* The position of Alta Vela was accurately determined by Captain R. Owen, R.N., who places the summit of the hill in lat. 17° 28' 50'' N., and long. 71° 39' 12'' W. The longitude depends upon the flagstaff of fort Charles, Port Royal, Jamaica, being in 76° 50' 38'' W.

Agujero (Petit Trou), is about 12 miles to the north-east of cape Mongon. The vicinity of it may be recognised by a deep indentation in the hills. This anchorage is somewhat protected by a reef 3 miles in extent, through which are two openings, one towards the east, the other near the west end. The former, called the windward passage, is about 2 cables wide; but there are several detached rocky heads in it, and on one as little as $10\frac{1}{2}$ feet, with deep water between. In the latter, called the lee channel, there are 18 and 20 feet. The anchorage within, however, is so studded with coral heads, that there is scarcely a berth to be found where a vessel will swing clear with 70 fathoms of cable out, it is therefore necessary to moor; and no vessel should enter it drawing more than $10\frac{1}{2}$ feet. The depth gradually increases from the shore, but at the distance of $1\frac{1}{2}$ miles there are only 3 fathoms.*

This is an exceedingly dangerous place; many wrecks occur, and in 1877 the British Vice-Consul at San Domingo called the attention of the Board of Trade to these wrecks with a view of masters of vessels and shipowners being warned of the risks they incur by going there.

Directions.—It is extremely difficult to enter this anchorage, and without a pilot attended with considerable risk. The time for entering the passage should be between 11 a.m. and 1 p.m., when the sun is high, and the dangers in the harbour more clearly seen, some of which have only about 6 feet water on them. The vessel should be under easy but commanding sail, and then piloted by the eye from the end of the bowsprit. The helm must be well attended.

Carlos point is a little further northward, and beyond it is the anchorage of Riocito, where the water is deep, and vessels lie near the shore and load during fine weather, but it is exposed and dangerous.

The coast between Agujero and Nisao is low and cliffy, backed by high land, the mountain range of Cibao. The hand-lead is of little use in approaching this part of the coast.

Tides.—During the increase of the moon the streams set regularly twelve hours each way, the ebb to the east, the flood to the west, at the rate of about a knot an hour. On the decrease there is no ebb at all, and the velocity of the flood increases to $1\frac{1}{4}$ knots. The rise and fall is about 3 feet.

Winds.—The sea breeze at this anchorage sets in from the north-east about 2 a.m., and continues to blow from that quarter until 7 or 8 p.m.,

* The description of the coast from hence to Saona is compiled chiefly from brief remarks made by Sir R. H. Schomburgk in 1850. See "Nautical Magazine," vol xxii.

when it veers to East and E. by S. until near midnight; there is consequently little or no land wind.

Bauruco anchorage.—About 5 miles northward of Riocito, off the mouth of the river Nisaito, is the anchorage of Malapasa, which is easily known by several steep white cliffs. This anchorage is dangerous, as is also that of Nisaito and Naranjal, a little farther north.

Three miles N.E. of Malapasa is the anchorage of Bauruco, which is contracted and fit only for small vessels, in from 12 to 15 fathoms water, $1\frac{1}{2}$ miles from the shore, with a reef on the south and another on the north. The shore is uninhabited. During the sea breeze vessels are unable to leave this anchorage, as the entrance is narrow and a sea sets in.

The bays of Neiva and Ocoa are formed between Avarena point on the west and Salinas point on the east, 23 miles apart. They are open to the southward, and the heavy sea which is caused by the prevailing winds when they blow strong renders the western shore dangerous to approach. This coast is bordered by a sand-bank, generally narrow, but in places it extends off $1\frac{1}{2}$ miles; the western shore is also skirted by a reef, and the eastern shore partly so.

In these bays are various ports and anchorages, some of which are formed by reefs; those in Neiva afford moderate shelter, but those in Ocoa are very good. The mountain of Bauruco on the west, and that of Martin Garcia to the north-west, are conspicuous objects; to the eastward are the plains of Bani, backed at the distance of 4 or 5 miles by the chain of the Cerro Gordo.

Neiva bay is formed between points Avarena and Martin Garcia; it is about 8 miles wide and the same distance deep, and open to the south-east. The river Neiva empties itself at the head of the bay, about 10 miles westward of Martin Garcia point; but the bar is only passable to boats.

About half a mile westward of Martin Garcia point there is a well-sheltered anchorage in 5 fathoms water, with the prevailing winds, at about 2 cables from the shore, and midway between some red and white cliffs.

Barahona is a reef harbour, W.S.W. of the red cliffs, which requires the assistance of a pilot, and is by no means a desirable place for large vessels. The reef is steep-to; there is no bottom with 120 fathoms at 4 cables off, and it shoals suddenly to 5 fathoms, and soon after to 10 feet. When within 2 miles of it the village will be seen, and above it two ridges of hills, one overtopping the other; there is a hummock on each. To enter, run in with the above hummocks in one, and having cleared the weather reef in 4 or 5 fathoms water, anchor in 7 or 8 fathoms

with a small islet bearing West. There are several other openings fit for small vessels, which may anchor closer in shore; but be careful to avoid the sunken Fishing rocks, which will be under the lee to the northward of the village.

Ocoa bay.—From Martin Garcia point the coast trends to the north-east, and then round to south-east and south to Salinas point, forming Ocoa bay. The latter point bears from the former about E. by S. 18 miles, and from this line the bay is 12 miles deep, and in it are several good anchorages.

Port Azua is a short distance to the northward of Martin Garcia point, and has only 12 to 15 feet water at its entrance. Small vessels of that draught, however, will lie here quite land-locked and secure. The entrance is very narrow, and a reef extends off from the north point. Large vessels may ride outside in fine weather, in from 9 to 3 fathoms; but the anchorage is entirely exposed to the sea breeze.

Port Escondido is about 5 miles to the northward of Martin Garcia point, and the entrance is about half a mile wide. On the north side it is foul to the distance of a cable, but on the south side the depths are $4\frac{1}{2}$ to 5 fathoms within half a cable of the shore. Half a mile within the entrance, and in the centre of the channel, there is a rocky shelf, 2 cables in length north and south, and one cable in breadth. In entering it will be better to keep within 2 cables of the southern shore, to avoid this shelf, and large vessels should anchor about a third of a mile within the entrance; a quarter of a mile within this the depth decreases to $2\frac{1}{2}$ fathoms. They may also anchor in 4 or 5 fathoms to the northward of the shoal, about 3 cables from the entrance; but this anchorage is more exposed than the other. Small vessels drawing 13 or 14 feet may proceed farther in, and will find it a secure harbour, sheltered from all winds.

Azua bay.—The sea sets into this anchorage with great force, and with the sea breeze vessels ride very uneasily. Boats can seldom go off with wood after 11 a.m. There is no room for working, and vessels leave with the land wind. A reef extends from the western point, and near the eastern point the depths are very unequal. The river Via empties itself into the bay. Tortuguero is the port of Azua, and considered a tolerably good anchorage. The mountains of Azua are covered with trees, which produce wood of a yellow tint, useful for cabinet work, and easy to polish.

Caracoles anchorage is off the mouth of the river Caracoles or Sipisipi, in 5 or 6 fathoms water, at $1\frac{1}{2}$ miles from the shore. It is tolerably convenient for landing notwithstanding the heavy swell which sets in with southerly winds.

Ocoa road is about 6 miles to the northward of Salinas point; between this and Caracoles river, a distance of 7 miles, the coast lies in a general north and south direction. The anchorages are well sheltered from the usual strong trade wind, but the bottom is sand and loose stones, and the anchors easily drag. The usual anchorage off the entrance of the river is confined to a narrow ledge of sand with rocky patches, very steep-to, and so close to the shore that a cable must be carried to the nearest palm trees, keeping an anchor to the westward to check the vessel against the land wind at night, which blows from the west and W.N.W. The north side of the river is the best. A large number of ships may, however, anchor here in safety. The anchorage should not be approached before the sea breeze is established, about 10 a.m., and preparation must be made to meet the sudden and violent gusts which rush off the land after passing Ocoa point, the south extreme of the bay.

From Ocoa point the coast, forming a slight bay, trends to the E.S.E. for $2\frac{1}{2}$ miles to Matasola point, which is a little salient, low and covered with trees. This point is the north extreme of port Caldera, and to the north of it there is a lake which communicates with the sea in the rainy season. The mouth of the lake is known by the interruption of the line of trees which cover all this low shore. Between the two points are several rocky projections, and the coast is bordered at the distance of $1\frac{1}{2}$ miles by coral banks, forming between them and the land a deep but dangerous channel. On these banks there are from $1\frac{1}{4}$ to $2\frac{1}{2}$ fathoms water.

Water.—The watering place is at the mouth of the river of the above name, $1\frac{1}{2}$ miles northward of Ocoa point, where several boats can water at a time.

Port Caldera.*—Caldera, the south point of entrance to the port, is a low tongue of sand and the termination of a flat peninsula of the same name, which is nearly all occupied by a salt lake, and partly covered by brushwood and palm trees. The point lies about half a mile S. $\frac{1}{2}$ W. of Matasola point, but the shoals bordering the northern shore contract the breadth of the channel to $1\frac{1}{2}$ cables, with depths varying from 4 to 9 fathoms. At $2\frac{1}{2}$ cables eastward of Caldera point there are several banks with 2 to 9 feet water on them, and separated by narrow deep channels. These banks divide the port into two parts; the western part, where vessels generally anchor, is between the bank on the east and the peninsula of Caldera on the west; the eastern part is at the head of the port and eastward of the banks.

* See Admiralty plan :—Port Caldera, scale, $m = 2.4$ inches, in plans of ports, San Domingo, No. 2,406.

This latter anchorage is about three-quarters of a mile east and west and the same distance north and south, with 5 to 7 fathoms water, over mud, which diminishes to the shore. When the sea is smooth, all the white sand-banks are easily seen from the deck, but during a fresh breeze from the S.E. or E.S.E. the sea breaks on all sides, and it is difficult to distinguish the channels without being very near the bank which forms them. A stranger should, therefore, take a pilot.

The western anchorage is about half a mile east and west, and a quarter of a mile north and south, with from 7 to 3 fathoms water, sand and coarse gravel. Vessels lie within the entrance, with Caldera point N.N.W. $\frac{1}{2}$ W. distant a quarter of a mile. These anchorages are sheltered from all winds. Sailing vessels should anchor outside until the wind slackens, and then warp or tow in. The coast between Caldera and Salinas points, $1\frac{3}{4}$ miles S.W. by S., is of sand, and clear of danger; about midway between them the shore projects a little at Ranchos point, which is bordered, at the distance of a cable, by a bank of coral and sand with about 10 or 12 feet water on it.

Anchoring outside, a good berth is in 11 to 14 fathoms at about 2 cables W. by N. of Caldera point. Should the wind be scant, do not approach the northern shoals within the depth of 9 fathoms. Here a large number of vessels may lie with safety during eight months of the year, there being danger only during the hurricane season.

Water.—There is no fresh water at port Caldera, for which it is necessary to go to Ocoa river. The best time is to leave Caldera in the morning with the easterly breeze, and return with the land wind at night. Wood may be obtained.

Tide.—The rise of the tide in port Caldera is about 2 feet, but the establishment is uncertain.

Winds.—The prevailing winds during the day are from East to S.E., and during the night from the westward; but sometimes in 24 hours they blow from all points of the compass. Between the easterly and land winds an interval of calm takes place. Vessels can lie with safety in this port during the hurricane season. The lakes in the vicinity of the port, some of which have been converted into salt-ponds, are unhealthy in the rainy season.

Directions.—Vessels from the westward and bound for port Caldera or neighbouring anchorages, when able to weather that part of the coast between Beata and Avarena, should gain nothing, as the current which runs strong to the westward outside sets eastward inshore. But it is desirable to keep well clear of the western shore of the gulf and windward

of the intended port. If bound to port Caldera, continue working to windward, but do not stand south of lat. 18° N.

From the eastward, having recognised Nisao point, close the coast to a distance of 2 miles. A white sand-bank extends off half a mile from Santanilla point. Salinas point, which is low and sandy, will also be known by the sea breaking over it in easterly winds. Round that point at the distance of 2 or 3 cables, and then haul to the northward along the coast, keeping the lead going.

Salinas bay, between the point of the same name on the west and Palmas point on the east, has from 15 to 12 fathoms water at a cable from the shore. The best anchorage is with a group of palm trees near the eastern point of the bay bearing about E. $\frac{1}{2}$ N., and in line with two hills, also covered with palm trees. Small vessels anchor in 5 fathoms, with a stream cable fast to the shore in case the anchor should drag.

The coast between Salinas and Nisao is fringed with low bush.

Catalina bay, westward of the point of the same name, is but little frequented. In its western part small vessels only can enter in 3 fathoms water. Between these two latter bays are those of Estancia Colorada; Agua de la Estancia, which is the port of the town of Bani; Paya; and Sabana, which is $3\frac{1}{2}$ miles westward of Catalina point. Vessels anchor in this last bay in 5 or 6 fathoms water, protected by the coast on the east, which trends round to Catalina point, about E.S.E. of the anchorage.

Point Nisao.—From Salinas point the coast takes an easterly direction for 36 miles to Nisao point, which is low, descends to the sea by a gentle slope, a reef extends W.S.W. half a mile from it; inside the reef fishing boats find shelter. The shore is generally bold, and the soundings which are found off some parts to the distance of 2 or 3 miles afford temporary anchorage for vessels visiting this coast for wood. About one mile southward of Catalina point there is a shoal with only 12 feet water on it, and it is stated that reefs extend off this part of the coast, and which are dangerous, the lead being of no use.

River Nisao.—Between Catalina and Palenque points the shore forms a bight, in which is port Viejo and the river Nisao. There is anchorage off the river in from 7 to 9 fathoms water, at about $1\frac{1}{2}$ or 2 miles from the entrance; but small vessels may go as close in as 4 fathoms. The bar is almost impassable, even to boats, on account of the rapidity of the stream, and landing is very difficult, as the sea breaks violently some distance from the shore. The tides run also with great velocity.

Water.—There is a small village near the shore, and the water of the river is fresh about a quarter of a mile within the mouth.

The coast between Nisao point and Santo Domingo city is low and rocky, with very few sandy beaches.

Port Viejo is about 4 miles westward of the river, and a vessel may anchor here in 7 fathoms water at $1\frac{1}{2}$ miles from the shore.

Santo Domingo bay.—From Nisao point the coast turns rather abruptly to the N.N.E. for about 18 miles, and then to the eastward for about the same distance to Caucedo point, forming the bay of Santo Domingo, which is 25 miles wide and 10 miles deep.

Port Palenque is about 3 miles northward of Nisao point, and affords sheltered anchorage in 4 fathoms water, gravel bottom, but it is very confined. The shore is so bold that there are 3 fathoms close to the beach; but be cautious to avoid a reef which extends to the south-east and north-west from the weather point. A southerly breeze prevents a sailing vessel leaving this anchorage; but there is no difficulty with the usual trade wind.

River Najallo.—This river empties itself into a bight about a mile in extent, and there is exposed anchorage at about three-quarters of a mile from the land.

River Nigua lies a short distance to the northward of the river Najallo, and here the edge of the bank lies so close to the shore as only to afford temporary anchorage under favourable circumstances. In strong breezes the current rushing into Santo Domingo bay causes the sea to rise 13 to 15 feet above the ordinary level. There is a small village near the entrance of the river, and the water is fresh about a quarter of a mile above the mouth, but it is not considered good, and the place is unhealthy.

River Jaina empties itself at the head of Santo Domingo bay, at about 5 miles westward of the Ozama. There is no shelter whatever from the heavy swell that rolls in. During calms and northerly winds are the only periods when cargo can be shipped.

SANTO DOMINGO HARBOUR* lies W.N.W. 15 miles from Caucedo point, at the entrance of the river Ozama, which is barred, having about 12 feet over it at low water, with 18 to 22 feet within, almost alongside the banks of the stream, for a distance of more than 3 miles from its mouth. It is readily found by the city which is built at the entrance, on the right bank of the river; an extensive savannah lies to the westward of it, enclosed by an amphitheatre of hills. The city is surrounded by a wall, and defended by a fort at the entrance of the river, with several other

* See Admiralty plan:—Santo Domingo harbour, No. 2,240; scale, $m = 5 \cdot 8$ inches.

outworks and bastions, all in a ruinous state. The population may be estimated at about 15,000.

The road of Santo Domingo affords very indifferent anchorage. The bank of Estudios extends about one mile from the shore, having from 5 to 25 fathoms water on it, composed of rock covered with sand and occasionally mud, steep-to, and for the the first few casts of the lead the soundings are irregular. During the hurricane season and between November and March (from the race) the heavy sea which occasionally rises disturbs the bottom, and the anchors drag. Should, however, the anchors hold, which is unlikely, the cable would part, and the vessel probably be wrecked; with threatening weather it is necessary to put to sea.

Ozama river.—The outer part of the entrance to the river, between Homenaje point on the west and Torrecilla point S.E. by S. of it, is half a mile in breadth. The latter point is low, rocky, and a bank of from $1\frac{1}{2}$ to $2\frac{1}{2}$ fathoms extends a cable to the south-west, and in strong breezes the sea breaks heavily on it. Thence the edge of the coast bank, with $1\frac{1}{2}$ fathoms water on it, runs almost in a straight line to the northward as far as the Sand spit, above the south-east angle of the fort, and which is low, projects, and contracts the river to about half a cable in breadth. Half a cable N.E. by N. of Homenaje point there is usually a buoy, and a little northward of it, in front of a salient angle of the citadel, and near the shore, are several rocks on which the sea breaks. The outer part of the bar lies between Torrecilla point and the lighthouse. From recent dredging operations, vessels drawing 13 feet can enter Ozama river; it is intended to further dredge the bar to a depth of $3\frac{1}{4}$ fathoms.*

A steam vessel, drawing 10 feet water, trades between this harbour and the United States.

In 1883 the population of Santo Domingo city was 15,000, the exports were valued at 155,000*l.* and the imports at 470,487*l.*; 178 vessels, representing 87,602 tons, entered the port during the same year; the exports are gums, hides, honey, beeswax, sugar, cocoa, coffee, mahogany, &c.

Supplies.—Fresh provisions may be obtained; the water used for drinking is kept in reservoirs, as that of the Ozama is salt for several miles up. On the eastern shore of the river there is abundance of good running water, but inconvenient to procure on account of the distance. Coal may be had.

LIGHTS.—On fort San José, from a very conspicuous skeleton iron tower, painted white, is exhibited a *revolving* light, alternate *red* and *white*

* In 1883 the bar at the entrance to Ozama river had shoaled to such an extent that it was unsafe for vessels drawing more than eight feet water to enter the harbour.

once a minute, at an elevation of 95 feet above the sea, visible 15 miles; but this like all other lights in San Domingo, is not to be depended upon.

A *fixed* white light visible about 3 miles is also shown from the south extreme of the eastern mole in the Ozama river. Reported inefficient, and to be sometimes extinguished, 1887.

Directions.—Approaching this port it will be useful to remember that a few miles to the eastward of the Cibao range of mountains two small hillocks rise to a height of 200 or 300 feet above the plain; these make as two islets long before the low shore appears, and if kept on a N. by W. bearing will lead a vessel up the anchorage, on nearing which it will be requisite to keep to windward of the port, especially with a fresh breeze, and the lead should be quickly hove as the bank is steep-to. The discoloured water from the river may be seen some distance from the land. The vessel should be under easy sail, so as to anchor when the bearings are on. The best holding ground for large vessels will be found in 8 fathoms, sand and mud, with a few houses on the east side of the river Ozama, open of the city, and Torrecilla point, N.E. by E.; with the houses shut in the bottom becomes rocky. Being open to the southward, the sea breeze sends in a heavy uneasy swell, and the stream from the river causes a vessel to ride broadside to it; it is by no means a safe anchorage.

Vessels drawings* 11 feet should not enter the river without a pilot, and the swell of the sea should be considered; however, in case of necessity, they may cross the bar by bringing a square white house on the eastern bank open twice its breadth of the Signal tower point. Run in on this mark until within about 2 cables of the point, then steer for the Sand spit on the east side of the river, which must be passed within a few yards, to avoid a small rock off the opposite shore. Or bring the south-east angle of the city to bear North or N. by E., and steer for it until about 2 cables from it; then steer about N.N.E. $\frac{1}{2}$ E. until the Sand spit bears N. $\frac{1}{4}$ W., when proceed towards it, passing eastward of a buoy near the point, and up the middle of the river.

As the current is very strong, anchor as near the shore as possible, either off the custom house or northward of the city. From the bastion of Don Diego upwards, a vessel can moor at about 75 yards from either bank.

In a sailing vessel it is necessary to have the sea breeze to enter the river, and the land wind to leave it.

Tides.—The stream out of the river Ozama runs with great velocity. The rise of tide is about 2 feet, but the time of high water is uncertain.

* See remark on previous page.

During the rainy season the depth over the bar is greater on account of the swelling of the river.

Winds.—During the winter months, and especially in the spring, the land and sea breezes succeed each other with tolerable regularity; but during the remainder of the year they undergo some interruption, particularly in the summer season; frequently the fresh north winds on the south coast of San Domingo completely overcome the sea breeze. Within the Ozama the land wind blows from N.N.E. to N.E., and the sea breeze from South to S.S.W. The first begins soon after sunset, and continues until 8 or 9 in the morning.

Tides and currents.—Between Beata point and Saona island, when the moon increases, the ebb tide sets eastward 12 hours, and the flood westward 12 hours. The ebb begins at 9 or 10 in the morning and runs at the rate of $1\frac{3}{4}$ miles an hour. The rise of tide is a little more than 3 feet in Agujero, and $1\frac{1}{2}$ feet at Nisao point. When the moon decreases, the stream runs invariably to the westward during the 24 hours, at from one to $2\frac{1}{2}$ miles an hour. The weather is then changeable, and at times strong squalls are experienced. Off this part of the coast of San Domingo, after fresh northerly or southerly winds, the current often sets eastward, and occasionally at other times. The westerly current strikes the coast between Beata point and the mouth of the Neiva, then turns to the north-east as far as that river, and thence eastward trending with the coast.

Aspect.—To the eastward of the Ozama the plains extend 15 to 20 miles inland; but to the westward, at 4 or 5 miles from the shore, are the first steepes of the southern rise of the Cibao chain, which runs nearly through the middle of the eastern part of the island, lowers gradually, and terminates near cape Engaño. The peak of Yaque, the highest part of the chain, rises N.W. by W. $\frac{1}{3}$ W. from the city of Santo Domingo, distant about 66 miles. The difference in the aspect eastward and westward of the river is useful when bound to this anchorage.

The shore eastward of Torrecilla point is almost entirely composed of rock; there is scarcely a sandy beach to be seen, and the sea generally breaks against it with great violence.

La Caleta is a small bay close to the westward of Caucedo point, where temporary anchorage will be found in from 3 to 7 fathoms water, sheltered as far round as S.E. Near the point there is an embarking place for mahogany, but large vessels are obliged to load under sail.

Andres bay is formed between Caucedo and Magdalena points. The outer part of this bay is not safe, but off Agua del Rey, in the inner or

eastern part, at about 4 miles from Magdelana point, there is fair anchorage off the beach in 5 fathoms water, but a heavy swell rolls in. A vessel will lie sheltered as far round as S.E., being open to the southward. There is another spot in the bay, called Playa de Andres, where wood is also shipped; but the anchorage is 3 miles from the shore, outside an extensive reef, which forms with the coast a channel of 9 feet water. This place is famed for the prodigious number of pigeons which visit it in May and October, when they may be killed with sticks.

Guayacanes is an open roadstead, at about 18 miles eastward of the city of Santo Domingo and the anchorage is about a mile from the shore, in 8 or 9 fathoms, good holding ground. The beach is skirted by a reef, through which there is a small opening for boats to the landing in front of the settlement. Between this and Andres there is also a similar exposed anchorage off the village of Juan d'Olio.

River Macoris, 5 miles eastward of Guayacanes, is capable of admitting vessels of 10 feet draught. The entrance, between the south point and Tibiz point, northward and westward of it, is about half a mile wide; but nearly in front of it there is a small cay, with a reef extending from its north-east end. An extensive mud flat runs off from the western side, and the channel, with 15 to 17 feet water, consequently lies close along by the eastern shore; be careful, however, to avoid a small rocky head, on which there are only 6 feet, called Edward shoal, which lies between the south and north points at about half a cable from the former, which, with the reef from the cay, contracts the channel to about $1\frac{1}{2}$ cables.

The mark to clear Edward shoal is the second cocoa-nut tree near the captain of the port's house in the village on the east shore in one with the north point; the cocoa-nut trees should be kept just open after passing the islet reef until the vessel is within the Edward shoal, when haul in, and anchor in 11 feet water just within the north point. The river can only be left with a fresh land wind, and care should be taken to avoid the Edward shoal, as the current sets towards it. The rise and fall of tide in the river is about 2 feet.

Water.—The water in Macoris river becomes fit for use at about 2 miles within the entrance.

River Soco is about 6 miles eastward of the Macoris, and although one of the largest streams on this part of the coast, the bar will only admit the passage of a boat. A vessel may anchor in 5 fathoms water at about 3 miles from the shore, with the entrance bearing N. by E. or N.N.E., but she will be completely exposed to the full force of the trade wind. Small vessels anchor in 3 to 4 fathoms, exposed to southerly

winds, and scarcely sheltered by Mortero point, which lies S. by E. from the mouth of the river. The landing-place is a cable within the river on the left bank, with deep water.

River Cumayasa is nearly abreast the west end of Catalina island, and is said to be of sufficient breadth and depth to admit vessels of considerable size. The anchorage for those drawing more than 18 feet is in about 4 fathoms water, at about $1\frac{1}{2}$ cables within the entrance, a little southward of the smaller of two coves on the eastern bank, and near a small dry rock. The channel into the river for small vessels of 6 or 8 feet draught lies close by the right bank, and they may ascend as far as the rock of San Pedro, about two miles from the mouth. Higher up there are three islands, beyond which the river becomes narrow and only navigable for boats, which can get up to San Juan, 2 miles above San Pedro.

Water.—The water in the Cumayasa becomes good for use a little above San Juan, where the river falls into a basin called Agua Dulce, but boats cannot approach it nearer than a cable.

Santa Catalina is a small low island lying about 2 miles from the shore, between the rivers Cumayasa and Romana, and 16 miles north-westward of Saona island. The channel between it and the main may be safely navigated by vessels of the heaviest draught, but they must keep the northern shore aboard, to avoid a reef, on which the sea generally breaks, off the north-west end of the island. There is good anchorage in $3\frac{1}{2}$ fathoms water near a bay at its west end.

River Romana is about 3 miles north-eastward of Catalina, and may be known by the village which will be seen on the hills on the right bank, about 180 feet above the sea. The river forces its way between perpendicular limestone cliffs, and its entrance is not quite a cable wide; it is, however, capable of receiving vessels of large draught, and is considered one of the best sheltered ports on this side of the island. The only danger to be avoided is a small rock with 6 feet water on it, lying about 75 yards south-east of the western point. A little eastward of the entrance the shore is closely skirted by a reef, which is seen.

Water.—Boats frequently get as far up as the rapids for water. There are no difficulties until coming to a little island where a shelf of rocks runs across, over which there are only $2\frac{1}{2}$ feet, and but one foot near the rapid during its mean level. The river falls over the shelf, so that the boat may almost lie under it, and water very conveniently without landing the casks.

Directions.—The entrance to this river being so narrow, it can only be navigated with the sea and land breezes; as it is approached

two prominent points within will be seen, one on either side of the river; the western point about half a mile, the eastern three-quarters from the entrance. When in one they lead on the rock, with 6 feet water on it, just described; when in 9 fathoms water, they must therefore be kept just open of each other, bearing about N. by W. $\frac{1}{2}$ W. Run in on this line, and having entered the river, keep the western shore aboard; and when near two small rocks, 6 or 7 feet above water, a little to the southward of the *inner* point mentioned above, a vessel may anchor in 5 fathoms, with the northernmost of the two rocks just within the entrance on the eastern bank in one with Aguila, the outer east point. The vessel must be steadied with a hawser to the rocks off the western bank, and if necessary with another to a rock on the east side of the river.

Small vessels drawing 10 or 11 feet will find better shelter just round the point, but they must take care not to go far beyond it, as off the eastern inner point there is a flat with only 6 feet water on it. With the assistance of a pilot, however, they may proceed 2 miles above the entrance.

River Quiabon.—The anchorage off this river, a little eastward of the Romana, is an open roadstead, but with excellent holding ground. The best berth will be found in 9 fathoms water, with Minas point in one with Aguila, the east point of entrance to the Romana; and two cocoa-nut trees on the shore, in front of the largest house in the village, bearing North. The depth gradually decreases, and there are 3 fathoms within 3 cables of the shore. The ground eastward of the above mark is rocky; and there is said to be a shoal with 13 feet water on it in that direction. The mouth of the river is barred, and sometimes dries; its depth depends upon the freshes and strength of the stream, but it seldom exceeds 3 feet.

Water.—Boats can sometimes ascend the Quiabon as far as the village of Gato, the port of the river Higüey, situated on the left bank, about 6 miles from the entrance. In the rainy season the water will be found good about 2 miles above the bar.

Tides.—The rise of tide in the Quiabon river is about 2 feet.

Las Minas.—About half a mile westward of the river Quiabon is the loading place called Minas; and a little farther there are two others, named Burgado and Caletón; the latter is a little eastward of the Romana, unsheltered and difficult to reach in a sailing vessel on account of the current. The anchorages of Minas and Burgado are only fit for small vessels; large vessels are obliged to anchor off Minas in 19 fathoms water.

Bayahiba is a good anchorage about $2\frac{1}{2}$ miles eastward of the Quiabon. A vessel may anchor in 6 or 7 fathoms water, at about one mile from the shore, where she will be well sheltered from the south-east by Saona island and Palmilla point.

Pilots.—Vessels bound to any of the anchorages just described, or those on the eastern coast, generally obtain a pilot at the city of Santo Domingo, which is the port of entry for all these places.

CURRENTS.—In the Caribbean sea, the currents are as a rule greatly influenced by the direction and strength of the trade winds, the prevailing set is between N.W. and west, but at the F. and C. of the moon, and about the autumnal equinox an easterly (weather) current is occasionally found, on the south coast of Cuba, north and south coasts of Jamaica, south coasts of San Domingo and Puerto Rico, and on the north shore of South America as far east as Trinidad.

WINDWARD PASSAGE.—By Windward passage is meant the passage which lies between Haïti on the east side, and Cuba with Jamaica on the other, the only obstructions in the channel are Navassa island (*page* 306), and the Formigas bank (*page* 307).

Directions.—Vessels from Jamaica usually run to leeward round cape Antonio, and through the Florida strait; but from October to March, when northerly winds prevail in the Florida strait, the Windward passage should be preferred, although ships are frequently opposed here by contrary winds and currents. In taking this passage the coast of Haïti must be gained as soon as possible, as there a windward current is frequently found. In steamers or sailing vessels with a fair wind, after passing the east end of Cuba, a course may be shaped for any of the passages between the Bahama islands, but the Turks island passage is not much used from the southward (*page* 478). The Caicos passage (*pages* 481 and 496), is well to windward and perfectly safe in the daytime, but the Crooked island passage, (*page* 495), is the best lighted, and with the new light on Watling island should be quite safe to navigate by day or night, from the north or south (*see page xxxv, Passages*).

Current.—In the fairway of the Windward passage the current sets to the south-westward at from 20 to 48 miles a day.

CHAPTER VII.

GREATER ANTILLES; JAMAICA, WITH THE CAYS AND
BANKS ADJACENT.

VARIATION IN 1887.

Navassa island, 2° 15' E.		Negril point, 3° 20' E.
Baxo Nuevo, 3° 45' E.		Grand Cayman, 3° 55' E.

NAVASSA ISLAND.

This island,* a dependency of Haïti, lies about W. $\frac{1}{4}$ N. 31 miles from cape Tiburon, and S.W. by W. $\frac{3}{4}$ W. 34 miles from cape Dame-Marie, is 2 miles in length in a north-west and south-east direction, one mile in breadth, and about 300 feet high. Its surface is nearly level, with steep sloping sides, verging all round into white cliffs of about 20 feet high, and inaccessible, except at the landing platform on the north-west side of the island, which was constructed by an American settler in 1855 for the export of guano. The island is of volcanic origin, composed of limestone, interspersed with veins of sharp honeycombed rocks of iron pyrites that on being struck give out a sound similar to bell metal. The spaces between the rocks were filled up with guano, making a flat surface. The guano has no smell, of a dark red colour. The market price in 1862 was 20 dollars a ton. The settlement is near the centre of the west side, 6 cables from the so-called S.E. point. A light visible 5 miles is kept burning all night in the settlement, and another light is hoisted at an elevation of 300 feet when the New York steamer is expected. There are several mooring buoys laid down for the use of vessels loading. In 1881 there were 196 men on the island, but no women.

With the exception of the north-west extreme, which is a prominent bluff, a narrow ridge or rocky step, about 15 feet high above the cliffs and a cable broad, extends all round the island. The summit is clothed with stunted palm trees and cactus, and is inhabited by iguanas and numerous flocks of sea birds. This island appears to rise from a small bank of soundings from one-third to about three-quarters of a mile broad. On the north and east sides the bottom is rocky, and the depth from 18 to 40

* See Admiralty plan :—Navassa island, No. 461 ; scale, $m=2\cdot7$ inches.

fathoms. On the west side the bottom is fine sand, with small shells, and anchorage will be found with the usual trade wind in 16 fathoms water, good holding ground, with the north-west bluff bearing North or N. by E., and the south-east point S.E. by E., about half a mile off shore; but a heavy swell sets round the south-east end of the island, and the current generally to the north-west. The wind seldom blows from the westward. From the north-west end of the island a coral ledge with $4\frac{1}{2}$ fathoms water on it extends a cable off. The north extreme is assumed to be in lat. $18^{\circ} 25' 10''$ N., long. $75^{\circ} 2'$ W.

FORMIGAS BANK.

The south-west end of this bank* lies N.N.E. $\frac{3}{4}$ E., about 39 miles from Morant point, and from the centre the fall in the high land of Jamaica will be seen to the northward of Plantain garden river bearing S.W. $\frac{1}{2}$ S. The bank is 8 miles in length in a N.E. by N. and S.W. by S. direction, and about $2\frac{1}{2}$ miles in breadth. It is steep-to, and near its edge there is a narrow vein of sand with from 9 to 18 fathoms water on it; but the body of the bank is rocky, with a general depth of from 5 to 7 fathoms. About 2 miles from the north-east end, and one mile from the eastern edge, there is a small patch with only $2\frac{1}{2}$ fathoms on it, and westward of it another of 3 fathoms, with $3\frac{1}{2}$ and 4 fathoms round them. With strong breezes the position of the bank may be recognised by the heavy swell which rolls over it.

MORANT CAYS.

The following information relating to Morant cays is by Lieutenant A. Carpenter, R.N., commanding H.M. surveying schooner *Sparrowhawk*, 1880.†

MORANT CAYS, a dependency of Jamaica, situated S.S.E. $\frac{1}{3}$ E., distant 33 miles from Morant point, Jamaica, are a group consisting of three small islets from 7 to 10 feet high, which, with the adjacent reefs, form a crescent, convex to the south-eastward, and occupying a space about 3 miles long and $1\frac{1}{4}$ miles broad.

The bank on which these islets stand extends (within the 100-fathoms line) 6 miles north-eastward from the group and 4 miles south-westward of them, with an average breadth of about 3 miles, and with depths over it ranging from 10 to 18 fathoms.

* See Admiralty chart, No. 486, sheet 4; scale, $m=0\cdot08$ inch.

† See Admiralty charts:—West India Islands, sheet I., No. 761; Jamaica and the Pedro bank, No. 486; Jamaica, No. 446; and plan of Morant cays on chart of Morant point to Port Royal, No. 255; scale, $m=cne$ inch.

The islets are known as N.E. cay, S.E. cay, and S.W. cay.

A reef, on which the sea constantly breaks, surrounds the Morant cays, extending from 4 cables N.N.W. of N.E. cay to 2 cables W. by S. from S.W. cay. There is only one opening through this reef, situated between S.E. cay and S.W. cay, with from 18 to 20 feet in it, and this should not be used except in cases of emergency.

The sea birds arrive at these cays in great numbers during March, and in April the islets are covered with their eggs, which are collected and conveyed in schooners to Jamaica; later in the summer turtle are caught, but the supply is becoming scarcer every year.

The supply of guano is abundant but of poor quality. Several wrecks lie on the reefs round these cays, which are occasionally broken up by the sea, and drift into the anchorage. In clear weather the high land of Jamaica is visible, Blue Mountain peak bearing N. 41° W. from S.E. cay, distant 52 miles.

N.E. cay.—This islet, 7 feet high, is at times divided into three portions, the sea washing over the connecting sand spits.

A conspicuous cocoa-nut tree stands in the centre of N.E. cay, with some smaller trees and bushes southward of it, and at the north extreme of the islet are two isolated trees.

On the southern portion of the cay are one or two houses and a small pier, also a pond of brackish water.

A sand-bank, 4 feet high, lies a cable southward of N.E. cay.

S.E. cay.—This islet, 8 feet high, lying one mile southward of N.E. cay, is covered with bushes and trees, among which one cocoa-nut tree rises considerably higher than the others.

There are two houses on S.E. cay and a pier on the west side.

The sand spits extending from the extremities of this islet alter in shape at different seasons of the year; in summer the south-west spit is washed away, and the sand deposited on the western shore of the cay.

The west extreme of S.E. cay was determined to be in lat. $17^{\circ} 23' 20''$ N., long. $75^{\circ} 59' 40''$ W.

S.W. cay.—This small islet, having a few bushes on it, lies one mile south-west of S.E. cay, and is 10 feet high.

There is one house on S.W. cay which can be seen from a distance of about 8 miles; a rocky ledge is used as a pier for shipping guano.

Landing.—Landing is seldom practicable at S.W. cay, but at the other islets, especially at their south-west extremes, an opportunity of doing so can generally be found; it is not advisable to land at the piers on the islets on account of the submerged reefs in the vicinity.

Anchorage.—On the west side of Morant cays the bank slopes gradually off to the depth of 10 fathoms, and anchorage may be taken up by the lead, carefully avoiding the irregular ground extending north-west of N.E. cay; the bottom is composed of dead coral with patches of small brown weed growing over it.

When approaching from the north-westward the water shoals suddenly after passing the 100-fathoms line, but a vessel may safely stand in with S.E. cay bearing S.E. until in the required depth for anchoring.

Small vessels, drawing not more than 12 feet, will find smooth water at half a mile westward of the south extreme of N.E. cay, but with strong northerly winds this is not a safe anchorage, as the sea then breaks in 3 fathoms.

Water may be procured by digging holes near the centre of either N.E. or S.E. cay, taking care, however, not to dig as deep as the sea level.

Current.—The drift current sets towards West and N.N.W., with a velocity of three-quarters of a knot an hour, after the trade wind has been blowing freshly for a day or two.

When the trade is lighter, a current setting to N.E. or East is frequently experienced.

Vessels having occasion to pass near Morant cays at night should keep northward of them.

Tides.—The rise and fall of tide at Morant cays seldom exceeds one foot.

Lieut. F. A. Moysey, commanding H.M.S. *Contest* in May 1882, reports having planted 200 cocoa-nuts on the S.E. cay, in rows 16 feet apart, and each nut 16 feet from its next, the direction of the rows being E. by S. On the S.E. cay, at this time, 17 trees were growing, one of which was bearing. On the N.E. cay 27 or 28 were growing and three bearing.

Directions.—Standing in for the east end of Jamaica from the south-east, Yallahs hill, which bears from Morant cays about N.W. 40 miles, will be a useful guide in clear weather; and in working up to the northward of the cays, the north-east end of Jamaica kept open of Morant point will lead to windward of them.

A shoal, with about 8 fathoms water on it, in lat. $17^{\circ} 46'$ N., and long. $75^{\circ} 45'$ W. was passed over in 1867, by the American brig *Georgia*. Position and depth require confirmation.

A bank was discovered and sounded over by the U.S. vessel *Albatross*, Lieutenant Commanding Z. L. Tanner, in February 1884; the least water obtained was 17 fathoms, coral bottom. This bank lies between the parallels of $17^{\circ} 35'$ N. and $17^{\circ} 45'$ N., the South point being in longitude

75° 45' W. It runs hence in a N.N.E. direction to the parallel of 17° 45' N. in longitude 75° 36' W., where it ends, having 21 fathoms and then upwards of 300 close to; the middle of the bank is 33 miles E.S.E. from point Morant. This bank seems to assume the shape and dimensions of the Morant cays and its bank; it has not been completely examined, and it is quite possible there may be less than 17 fathoms on it.

JAMAICA.

This island* was discovered by Columbus on his second voyage, on the 3rd May 1494, and was first colonized by the Spaniards in 1503. In 1655 it fell into the hands of the English, and has remained in their possession. Its length from east to west is about 130 miles, and its extreme breadth, which is near the centre of the island, between Portland and St. Ann bay, is 45 miles. From this line it somewhat gradually diminishes to the east and west, and terminates in well-defined points.

The island is generally of great altitude, and the Blue mountains, which occupy the eastern portion, rise to the height of 7,300 feet, but the most elevated peaks are seldom visible. The northern shore is pretty regular in its features, free of danger, and in most parts steep-to; but the south side, particularly near the middle, is deeply indented, and fringed with low cays and reefs which must be very cautiously approached. In 1881 the population amounted to 580,804. In 1873, 746 vessels, of 303,041 tons, entered inwards, and 782 vessels, of 312,164 tons, cleared outwards; the total amount of exports in 1884 was valued at 1,483,989*l.*, and the imports at 1,548,708*l.* The description of the island commences with the south side, westward from Morant point.†

Morant point,‡ the east end of Jamaica, is formed by a strip of low, swampy, wooded land, extending out about 2½ miles from a low range of hills about 800 feet high, running parallel to the south coast at the foot of the Blue mountains. It is about 2½ miles broad at the inner part, and thence gradually diminishes to the point, which is sharp and well defined when seen from the north and south. Approaching from the eastward, its position is first recognised by the iron lighthouse, 96 feet high and painted white, standing a few hundred feet within the high-water mark. The point is skirted by a reef which extends off to the distance of nearly a

* See Admiralty chart :—Jamaica, No. 446, scale, $m=0\cdot25$ inches.

† The relative positions of many of the ports of this island have been accurately determined by Capt. R. Owen, R.N.

‡ The description of the southern portion of the island from Morant point to Portland bight is principally from the survey and remarks of Staff Commander George Stanley, R.N., 1874.

quarter of a mile ; there are 22 fathoms water at $1\frac{3}{4}$ miles off, close to the edge of the bank ; and as the land is not more than 20 feet high, should the weather be thick or the light obscured, the greatest caution must be observed when nearing it. Overfalls are generally seen eastward of the point near the edge of soundings, and the stream runs at from one to 3 knots.

LIGHT.—The lighthouse on Morant point exhibits, at 115 feet above the sea, a white light, which *revolves every minute*. The light is visible from seaward when bearing from N.N.E. $\frac{1}{2}$ E. round on westerly bearings to S.E. by S., and in clear weather may be seen 15 miles.

Directions.—Approaching the island from the eastward, attention is drawn to the necessity of observing north and south stars for latitude morning and evening, after losing sight of Alta Vela, until Morant point light, or Yallahs hill is sighted. This so-called hill is about 19 miles westward of the point, and cannot be easily mistaken, being a remarkable mountain, 2,408 feet high, rising rather abruptly on its north side from the valley between it and the Blue mountain range, and falling with a long gradual slope to the sea on the south side, and its rounded summit is seldom clouded.

Approaching from the north-east through the windward channel, the Blue mountain mass will generally come first in sight, and strangers are apt to keep away too soon, which should not be done until the vessel's position is correctly ascertained, lest they may not be able to weather Morant point. It is advisable to keep well to windward until the lighthouse bears northward of West, as the current generally sets strong to the westward.

Coast.—From Morant point light the coast trends S. by W. $\frac{1}{4}$ W. $1\frac{1}{4}$ miles to S.E. point, between is a sandy bay studded with rocks ; it then turns W. by S. $\frac{3}{4}$ S. for 5 miles to Rocky point, and continues in the same direction for 3 miles further to port Morant. Between S.E. and Rocky points the reef extends from the shore to an average distance of one mile, and between Rocky point and port Morant to one-third of a mile, and in ordinary weather the sea breaks heavily upon it. Within the reef at Rocky point is a secure anchorage for coasters, and a good landing wharf. To seaward the bank of soundings extends about one mile.

Port Morant* is a small secure bight about one mile wide and $1\frac{1}{2}$ miles deep north and south, open from the latter quarter, with a depth of between 5 and 6 fathoms. Two small islands lie one cable off the eastern side of the entrance, and are bordered by reefs, which, with those from

* See Admiralty plan :—Port Morant, No. 454 ; scale, $m = 6.0$ inches.

the western side, contract the channel to a width of not more than one cable. The approach to the harbour is easily distinguished; the hills on the western side, between 400 and 500 feet high, slope gradually to the shore, and are higher than those on the eastern side, which rise abruptly from the sea. On the rise, near the upper part of the harbour, standing 180 feet high, is Bowden house; at the head of the harbour is a remarkable red cliff; and 2 miles inland, at an elevation of about 500 feet and between two palm trees, will be seen Kelly house. Palm point, on the western side of the entrance, may be known by the conspicuous cluster of trees on it.

Dangers.—Harbour shoal, a sandy knoll with 2 fathoms on it, lies nearly in the centre of the port, W.N.W. of point Pero, and with Kelly house open westward of the red cliff. Cotton-tree spit is a little northward of Harbour shoal, and extends from the eastern shore one-sixth of a mile.

Buoys.—On the eastern side of the channel, leading into the port, are two buoys, the outer in 26 feet is coloured *black* and *white* in horizontal stripes, the inner in 20 feet is chequered *black* and *white*; on the western side is one *red* buoy in 26 feet. The southern edge of Harbour shoal is marked by a red buoy in 22 feet water, with Leith Hall bearing N.W. distant $7\frac{3}{4}$ cables; and the eastern extremity of Red cliff N. by E. 9 cables.

The northern edge of Harbour shoal is marked by a white buoy in 16 feet water, with Leith Hall bearing W.N.W. distant $7\frac{1}{4}$ cables; the eastern extreme of Red cliff N. $\frac{1}{2}$ E. $6\frac{3}{4}$ cables; and Cotton-tree spit buoy N.E. $\frac{3}{4}$ E. 2 cables.

Cotton-tree spit buoy, chequered red and white, lies in 16 feet water, with Leith Hall bearing W. by N. $\frac{1}{4}$ N. $8\frac{1}{4}$ cables; the eastern extreme of Red cliff N. $\frac{3}{4}$ W. $5\frac{1}{2}$ cables; and Leith Hall spit buoy N.W. by W. $\frac{1}{2}$ W. $2\frac{1}{4}$ cables.

Leith Hall spit buoy, painted red and white in vertical stripes, lies in 12 feet water close to the southern edge of Leith Hall spit, with Leith Hall bearing W. $\frac{3}{4}$ N. 6 cables; the eastern extreme of Red cliff N. by E. $\frac{1}{2}$ E. $4\frac{3}{4}$ cables; and Cotton-tree spit buoy S.E. by E. $\frac{1}{2}$ E. $2\frac{1}{4}$ cables.

A red buoy is moored on the edge of the bank running off the shore, west of Harbour shoal, but the position of the buoys cannot always be depended upon.

Directions.—In entering port Morant great attention must be paid to the leading mark, for in strong trades and misty weather some difficulty may be experienced in distinguishing Kelly house. Kelly house in line with the eastern extreme of Red cliff bearing N. $\frac{1}{3}$ E., leads on the eastern side of the channel, and clear of Harbour shoal and Cotton-tree

spit; when Pero point shuts in the low point south of it, haul a little to the eastward of the leading mark and anchor in 5 or 6 fathoms with Bowden pier about N.E. $\frac{1}{2}$ N. As a rule vessels can enter or leave with the usual trade winds, and they seldom wait for the land wind in the morning. Good water may be obtained from the pier off the village. The rise of tide is about one foot.

Morant bay.*—From port Morant the shore bends in to W. by N. for about 4 miles to the town of Morant, and then to the W.S.W. 2 miles to Belvidere point, forming the bay. The reef still skirts the shore to the distance of about half a mile, but becomes more broken, with a better channel within, and terminates altogether south of the wharf at Morant. The sea breaks on this extreme end, and under the lee of it there is anchorage for large vessels in 5 or 6 fathoms water, with the court-house bearing about N. by E. A short distance westward of port Morant there is a narrow opening through the reef leading into Fisherman bay, in which the soundings are from 3 to 2 fathoms, but it is only fit for coasters; within the reef to the westward are other anchorages of the same character. Off this part of the coast the bank of soundings extends about $1\frac{1}{4}$ miles.

The English church and the court-house, both a little northward of the principal wharf, are the most conspicuous buildings in the town.

Galatea rock is a small dangerous patch with $2\frac{3}{4}$ fathoms water on it, lying about 3 cables S.W. of the western reef off Morant, with 7 fathoms between, and steep-to. From it Belvidere point bears W. $\frac{1}{3}$ N. $1\frac{1}{10}$ miles, and court-house, Morant, N. $\frac{1}{3}$ E. three-quarters of a mile. Large ships standing *into* the bay should not bring the court-house to bear northward of N.N.E.

Upper White Horses.—From Belvidere point the coast takes a W. by S. direction for 7 miles to Yallahs point, at the base of the lofty mountain already described. About 4 miles eastward of the latter point there is a small range of remarkable white cliffs of moderate height, called the upper White horses. Two miles southward of the White horses is an extensive flat with a depth of 11 and 12 fathoms, dark sand; northward and southward of this flat the water is shoaler.

Lamottes bank, a small rocky patch of 4 fathoms, may be considered the commencement of a narrow bank of 7 to 9 fathoms, which curves in an easterly direction for 3 miles, until nearly south of Belvidere point. From the 4 fathoms Yallahs point bears W.N.W. $2\frac{1}{2}$ miles, and the

* See Admiralty plan:—Morant bay, scale, $m = 1.9$ inches, on chart port Morant to Port Royal, No. 255.

centre of upper White horses N.N.E. $\frac{1}{4}$ E. $2\frac{1}{2}$ miles. The water is usually so clear that the bottom may be seen in 10 fathoms.

The coast from Yallahs point turns in a northerly direction for about half a mile, forming Salt pond bay, thence it sweeps to the westward round Yallahs bay, which is $1\frac{3}{4}$ miles from the point. Cow bay point, W. by N., 4 miles from Yallahs point, is low, rounded, and wooded, and its extreme is nearly 2 miles from the foot of the hills. One mile from the coast stands the chimney of the estate of Albion, which, with the cultivated land around, are conspicuous from seaward. Small craft find shelter under Yallahs point from the strong trade wind which sometimes continues for three or four days. Large vessels might also anchor here, but care must be taken to avoid an 18-foot patch from which the point bears E.S.E. distant nearly one-third of a mile.

In Yallahs bay vessels of considerable size load logwood; the best anchorage is south of the centre of the bay in 10 fathoms, about one-third of a mile from the beach, but it would be prudent to weigh on the first signs of a southerly wind, as a very heavy sea sets into the bay, and ships have been wrecked.

Off this portion of the coast, at a distance of about half a mile, the depth is 100 fathoms.

Westward of Yallahs bay the river of that name flows into the sea. From Cow bay point the coast trends with a slight curve inwards, N.W. $\frac{1}{2}$ N., for 4 miles to the lower White horses, a similar small ridge of cliffs to those eastward of Yallahs point. They lie at the base of a large round hill, 1,420 feet high, connected by sharp ridges with St. Catherine peak, of 5,100 feet, which is about 8 miles north-east of Kingston, and the same distance westward of the Blue mountains; this range forms the eastern boundary of the great plain of Liguanea, on the shore of which is the city of Kingston. From the lower White horses the coast runs to the W.N.W. for about 5 miles to the commencement of the Palisados, the foot of the Long mountain, and the head of Kingston harbour, over which is a conspicuous martello tower; one mile W.N.W. of the tower is a remarkable red cliff, which has been blasted to a considerable height and forms an excellent landmark. Along this portion of the coast the bank of soundings extends about half a mile from the shore.

Land and Sea Breezes are generally regular between point Morant and Port Royal; as far as Yallahs point the land wind is felt but a short way from the shore, but westward it extends to a greater distance. Working off port Morant in the early morning the sea breeze is almost invariably met with, the land wind being only of sufficient strength to carry a vessel clear of the harbour. Off Port Royal ships frequently carry it some distance to sea. In the early months of the year, when the

trade wind is not very strong, the land wind may come down with considerable but never with dangerous strength; its approach will be known by a strong earthy or dusty smell. The strongest sea breezes appear to be in June and July, and freshening as they advance westward, attain their greatest force off Port Royal. The time of commencement of the sea breeze varies from 9 a.m. to noon, and generally lasts until 5 or 6 p.m., but in some cases it may blow continually for three or four days. The beginning of the land wind is equally uncertain. In the summer or hurricane months the breezes are sometimes interrupted by calms and light southerly winds with heavy rains, and an exceedingly oppressive atmosphere; the sea breeze will rush in with violent squalls from the south-east, and last but a short time.

Currents.—Between point Morant and Port Royal, at an average distance of 3 miles from the shore, the current setting to the westward is seldom found to exceed one mile per hour, depending on the strength of the wind. From 20 to 50 miles East of point Morant it sets in a south and south-east direction at the rate of between 2 and 3 knots, causing a heavy sea. Two or three days of south-westerly or westerly winds will cause a slight current in an opposite direction. After heavy rains the discharge from the rivers will for a short time cause a slight local set.

PORT ROYAL.*—From about one mile south of the martello tower a low, narrow, sandy flat projects to the westward for about $7\frac{1}{2}$ miles, terminating in Port Royal point, on which is fort Victoria, but it is not a very conspicuous object. This peculiar tongue of land is more or less overrun with low mangrove bushes, particularly on its inner side, and is in part planted with cocoa-nut trees; it forms the spacious harbours of Port Royal and Kingston, and is called the Palisados. Near its western extremity is fort Charles, and within it, the town of Port Royal, naval hospital and yard. (Warping buoys are placed near the coaling wharves at the east end of the dockyard, and a buoy with staff marked 25 feet lies on the edge of the bank south of these wharves.) From its eastern extreme the sandy beach takes a W. $\frac{1}{2}$ S. direction for 2 miles, and then trends S.W. for $1\frac{1}{2}$ miles to Plum point; hence also the edge of soundings takes a south-west and southerly direction for 9 miles.

Plum point.—Eastward of Plum point the beach is fringed with a rocky ledge for about one cable, and about half a mile W. by N. of it is little Plum point, both points being foul for about a quarter of a mile; westward the beach is cleaner, but rocks skirt some of the points.

LIGHT.—At 66 yards northward of the extremity of Plum point is a white lighthouse, which exhibits at 68 feet above the sea a *fixed*

* See Admiralty plan :—Port Royal and Kingston harbours, No. 456; scale, $m = 2.45$ inches.

light, visible $14\frac{1}{2}$ miles. The light shows *red* between the bearings of N.W. by W. $\frac{3}{4}$ W. and N. $\frac{1}{2}$ E., and *white* from N. $\frac{1}{2}$ E. round by east to S.E. over the shoals fronting the harbour. A faint diffused white light is visible northward of the bearing, N.W. by W. $\frac{3}{4}$ W.

The east channel to the harbour is formed on the north by the Palisados, and on the south by numerous low cays and banks, which extend off shore to the distance of 3 miles, and soundings will be found from 2 to 4 miles outside them. The outer danger at the entrance of the channel is called the East Middle ground, which lies S.S.W. about $1\frac{1}{4}$ miles from Plum point. The channel is from 7 to 20 fathoms deep, and with the exception of the shoals on either side it is clear of danger up to Gun cay.

East Middle ground.—This rocky bank is composed of two knolls occupying a space of about half a mile, and separated by a narrow cut of deep water in a north and south direction. On the eastern knoll there are 12 feet water, and on the western 8 feet, steep-to, and the sea generally breaks when strong sea breezes prevail. A large *black* and *white* vertically striped buoy with a staff and cross batten marks the north-east edge of the eastern knoll in 7 fathoms, with Kingston church bearing N. by W., and Maiden cay in one with Healthshire, or Helshire hummock W. $\frac{3}{4}$ S.; the latter is a remarkable hill, 725 feet high, on the outer range of irregular hills on the south side of the island.

Maiden cay and rock.—Maiden rock lies about $1\frac{1}{2}$ miles westward of the East Middle ground, and N.E. one quarter of a mile from Maiden cay, which is sandy. It is a low barren rock, 100 yards long east and west, and 50 yards broad, having on its north end a *black* and *white* striped beacon, vertical 30 feet above the sea. It is connected to Maiden cay by a rocky ledge, dry in places, which extends also a cable to the northward of the beacon, and to the westward for about 4 cables.

Lime cay is 2 cables long in a N.N.W. and S.S.E. direction, half a cable broad, and partially covered with bushes. Its north-west end is rocky for $1\frac{1}{2}$ cables; the west and south-east parts are sandy. In case of necessity a vessel will find anchorage close under its lee in 10 fathoms, muddy bottom, taking care, however, to avoid the Lime cay shoal.

Lime cay shoal is a rocky patch, with $1\frac{1}{4}$ fathoms water on it, and about a quarter of a mile in length N.W. and S.E. The eastern ledge lies $2\frac{1}{2}$ cables westward of the north-west end of Lime cay. Dockyard clock tower in line with the east end of Gun cay clears it to the westward.

Rackum and Gun cays are the two innermost in this channel. The former lies W. by N. nearly $1\frac{1}{4}$ miles from Lime cay, and S.E. a little

more than half a mile from Port Royal point. It is very small, low, and barren, and from its north end a ledge of small dry rocks extends out one cable in that direction, at the extremity of which is a *black* and *white* vertically striped buoy in $3\frac{1}{2}$ fathoms water, with 5 fathoms close outside it. The cay is also foul on the south and west to the distance of nearly a quarter of a mile, but steep-to on the east side.

Gun cay, about 4 cables N.N.E. of Rackum cay, is somewhat larger, sandy and bushy. It is skirted all round by a reef which extends only a short distance from its south end, leaving a channel about one cable wide between it and the Rackum cay buoy. The reef extends one cable from the north side of Gun cay, marked at its extreme by a buoy striped *black* and *white* vertically, with the flagstaff of the Apostles battery in one with the flagstaff of fort Charles W. by N.

Approaching Port Royal by the East channel, Gun cay being wooded, is visible from a considerable distance ; but Rackum cay, now about 2 feet above water, can only be seen on nearing the harbour.

New shoal is a very small knoll with 24 feet water on it at about 140 yards southward of Port Royal beach. A buoy striped *black* and *white* *horizontally* lies in $4\frac{1}{2}$ fathoms water, with Kingston church spire over the south-eastern extreme of fort Charles beach ; the dockyard clock-tower, and fort Charles flagstaff in line ; and a conspicuous house on the summit of a distant round hill just open westward of the western extremity of Port Royal point. Between the shoal and beach the passage is clear, and there are 7 fathoms water within 40 yards of the buoy.

When buoys are temporarily removed, white nun buoys will be placed in their positions.

Beacon shoal, a similar small rocky head with 14 feet water on it, lies at about 200 yards S.W. of New shoal, and about $2\frac{1}{4}$ cables southward of Port Royal point. A beacon 12 feet high is placed in 16 feet water on the middle of the shoal ; it carries a cone-shaped cage painted *black* and *white* horizontal stripes.

Harbour shoal is about 40 yards in extent, with $2\frac{3}{4}$ fathoms water on it, and lies N.W. by W. 2 cables from Port Royal point. It is marked by a *red* buoy with a staff, and close to its south side the depth is 4 fathoms.

De Horsey patch, with $4\frac{1}{4}$ fathoms water on it, lies with Harbour shoal buoy South, one cable ; Port Royal point S.S.E. $\frac{1}{3}$ E., $2\frac{1}{2}$ cables ; and North Port Royal point N.E. by E. easterly, $3\frac{1}{4}$ cables.

Port Royal spit is a shoal formed by the submergence of part of the town in the earthquake of 1692. It extends off to the westward a little more than a cable from the centre of the town.

Church shoal, of coral formation, on which there is a depth of 11 feet, is situated 50 yards north-westward of the 3-fathom edge of Port Royal spit, with a channel inside 110 feet wide, and 3 to 4 fathoms deep.

This shoal within the depth of 3 fathoms extends N.E. and S.W. for a distance of about 40 yards, and is about 25 yards in breadth. From the depth of 11 feet, Gallows point west extreme bears N.E. $\frac{1}{4}$ N., and Port Royal point west extreme bears S. $\frac{1}{2}$ W. Drunkenman's cay just open of or touching Port Royal point will clear this shoal.

A conical red buoy is moored about 20 feet west of the shoal.

South Pelican spit is the northern boundary of the harbour and is formed by a very shallow sand-bank which runs off three-quarters of a mile westward of Gallows point, its western limit is marked by a pile beacon, and its southern edge by a small pile. These are all the dangers in entering the harbour from the eastward.

Directions for east channel.—The bottom of this channel is generally mud and sand, except for a short distance eastward of Gun cay, where it is mud only. In the harbour it is mud with a little sand, except near the shoals, where it is formed of broken coral and sand.

A pilot will be generally found off the east end of Jamaica. Run along the land about 3 miles off, passing southward of Lamottes bank, and when abreast Cow bay point, Plum point may be steered for; on nearing which to about $1\frac{1}{2}$ miles a vessel will be in soundings, and the East Middle buoy should be seen $1\frac{1}{4}$ miles to the southward of it. Then bring the flagstaff of the Apostles battery in line with the flagstaff of fort Charles, bearing W. by N., and run on for Gun cay; or the fall of Salt pond hills on with the west extreme of Dockyard wall W. by N. $\frac{1}{4}$ N. leads in.* The leading mark should be brought on before Plum point lighthouse bears North, in case the buoy should be adrift or out of its position.

From this distance a stranger will have some difficulty in making the first of these marks out, and will require the use of a glass. The Apostles battery is small, and built on the brow of a slightly projecting ridge about two-thirds the way down from the summit of the Salt pond hill; fort Charles will appear as a long low red wall just rising above the sea, and behind it will be seen the masts of the guard-ship and vessels in the harbour, and to the northward of it the church, dockyard clock-tower, and extensive range of Government buildings. This mark will lead up to the buoy on the north end of Gun cay ledge, when steer for Port Royal point, passing between it and the buoy on the New shoal, and on either side of the Harbour shoal. Having passed the latter and westward of Port Royal spit, haul up and choose a berth as most convenient.

* See View on chart.

As the turning at Gun cay point is rather sharp for long vessels in a strong sea breeze, they may pass through between Gun and Rackum cays. In this case, when abreast of Lime cay, steer for that narrow opening, and bring the flagstaff of port Henderson, at the northern foot of Salt pond hill, in one with Port Royal point, which mark will lead through; but the eye should be the guide for mid-channel, and after passing close to the northward of the Rackum cay buoy, steer on for the point, and act as before directed, or pass outside the Beacon shoal and then haul up. Vessels should not pass between the New and Beacon shoals. In a heavy ship it would probably be advisable to pass northward of Gun cay and southward of Beacon shoal.

The most convenient berth for merchant vessels will be found outside Port Royal spit; they should therefore shorten sail in time after passing the point. Ships of war secure to mooring buoys off the dockyard to which they are directed by signal, the buoys being numbered from south northward. These numbers, as also those of the coal wharves, are now shown on plan of Port Royal by the request of several captains and officers on H.M. ships.

At Night.—When about 3 miles off Cow bay point, the *red* light on Plum point will generally be seen, and it may be steered for; running for the channel its western limit should not be passed or the *white* light brought in sight until at about one mile from it, in order to clear the East Middle ground; then steer for Gun cay as before. Having rounded the buoy at the north end of Gun cay, steer about S.W. by W. until the light is open of the south end of Gun cay, bearing E. $\frac{1}{4}$ N.; then alter course to W. by N., which will carry a vessel between the Beacon shoal and West Middle rock; or take the channel northward of the New shoal, passing close round Port Royal point, which is steep-to.

When fort Augusta light bears N. $\frac{1}{4}$ E. a vessel may haul up westward of the Harbour shoal; if a steam vessel and going on to Kingston, fort Augusta light kept on a N. by E. bearing will lead westward of the South Pelican spits, and when at the distance of half a mile from the light the vessel will be near the edge of the shoal ground on the north side of the channel, when the course should be altered to about N.E. $\frac{3}{4}$ E., and the mariner should feel his way slowly, guided by the piles. When the *red* light at fort Augusta bears southward of West steer more to the eastward. Plum point light marks the north-eastern limits of the shoal ground eastward of the North Pelican spit and westward of Kingston harbour.

If the land breeze is likely to overtake the vessel before getting through the East channel, it will be better for a sailing vessel not to proceed farther to leeward than the upper White horses, but to stand off and on, until the

sea breeze comes down in the morning. It will be advisable not to be too hasty in bearing up until the sea breeze is observed to have firmly established itself in the harbour, for the crew will only be worried in bracing about the yards to the conflicting winds.

KINGSTON HARBOUR is a large spacious inlet running east and west, formed by the Palisados, and capable of containing many vessels of the largest size. Shoals extend westward and north-westward for one mile from Gallows point, and eastward bordering the northern shore of the Palisados at the distance of three-quarters of a mile to a mile as far as abreast the city, which with the shallow ground on the north-western shore of the harbour contract the ship channel to a very narrow breadth.

Ship channel.—This channel lies along by fort Augusta, an extensive ortification on the extremity of a low sandy spit of swampy land on the north western side of Port Royal harbour, and is pointed out by pile beacons on either side striped *red* and *white* vertically on the northern side, and *red* on the southern. The two outer piles on the south side are surmounted respectively by a barrel, and triangle base downwards; the next three by triangles base upwards; and the inner pile by a globe. Those on the northern side by a triangle, square, cross, and St. Andrew's cross; this last named beacon (known as Pond-mouth stake) is 4 cables westward of Tannery stake, it is in 18 feet water on the extreme edge of the bank. There is a *black* beacon 40 feet high, on the south-east angle of the fort. A red and white chequered buoy is moored in 27 feet, on the north side of Ship channel, at $1\frac{1}{2}$ cables S.E. $\frac{1}{4}$ S. from fort Augusta light beacon. Also a *red* buoy on the south side of the channel, from fort Augusta E. $\frac{1}{3}$ S. $1\frac{1}{4}$ miles. The narrowest part of the channel commences at about $3\frac{1}{4}$ cables S.S.E. from the flagstaff of the fort, and is here $1\frac{1}{2}$ cables wide. Farther on, at $3\frac{1}{2}$ cables eastward of the staff, the breadth of the channel between the piles is reduced to one cable. Thence it opens out gradually as the vessel advances to the eastward, with depths of 6 and 7 fathoms. Vessels of large draught lie alongside the wharves of the town, above which the water deepens to 9 and 10 fathoms. A beacon surmounted by a St. Andrew's cross, painted red and white chequered, has been placed on the southern edge of the shoal extending westward from Kingston custom-house. From the beacon which is named Tannery stake, Greenwich house is just open of the land south-east of it, bearing N.W. $\frac{1}{4}$ W., and Gallows point S.W. by W. $\frac{1}{4}$ W.

Kingston, the capital of Jamaica, stands on a gentle slope. The streets are regular and straight, running parallel to each other, but mostly unpaved, and during heavy rain some of them are impassable. The houses

are of brick, and two storeys high, having the front shaded by a piazza below and a covered gallery above. The principal buildings are the English and Scotch churches; the former, standing in a commanding position, is a large structure with a handsome tower and spire; several chapels, two synagogues, an hospital, various charitable institutions, court-house, theatre, workhouse, penitentiary, commercial subscription rooms, jail, &c. The market-place is in the lower part of the town, near the water side, and fairly supplied. There is also an ice-house, and the supply never fails. The Custom house is in the western part of the town and close to the beach.

LIGHT.—An indifferent light in a single lamp, 40 feet above the sea, is shown from the beacon at fort Augusta, *white* to the south and west, and *red* to the eastward.

Directions from Port Royal to Kingston.—In proceeding from Port Royal to Kingston, the commodore's flagstaff S.E. $\frac{1}{2}$ S. leads southward of the Pelican shoals; the mark to run into the channel is Healthshire, or Helshire point just open of Small point, S.S.W. $\frac{1}{2}$ W., or fort Augusta beacon N. $\frac{1}{2}$ E., until Lindos house, standing in the interior on the northern shore, comes in one with the lower red-topped house called old Greenwich hospital, bearing N.E. $\frac{3}{4}$ E., which mark will lead into the narrows. Upon nearing the mammee pile, the upper house must be opened entirely to the left of the lower one; this leads past the mammee in 42 feet; then the two houses may be brought again in line, and when Gallows point comes on with the dockyard and coal stores, haul round towards Kingston. Vessels turning through the narrows, and nearing the mammee, should take care not to open Lindos house to the eastward of the red-topped house at Greenwich, and should not stand into less than 27 feet on either side, as the bank is steep-to. The piles will be a guide, but vessels rarely go up without a pilot. The southern fall of Yallahs hill seen over the sudden rise of the bush on the Palisados leads up the harbour, where anchorage may be taken up as convenient.

A boat channel marked by stakes, having $3\frac{1}{2}$ feet at low water, has been dredged close to gallows point for the convenience of steam launches plying between Port Royal and Kingston.

Directions for leaving.—Having passed the pile off Creek pond, a bushy cay (just north of fort Augusta) in line with a large cotton tree on the low land westward of it leads to the narrows. Sailing vessels will find it advantageous to shift to the fairway at Port Royal the day previous to departure, so as to quit with the land wind at early dawn, and to get out well clear of the shoals before the sea breeze sets in.

East channel.—If bound to windward, the East channel will, of course, be the best; but it should only be taken by steamers or vessels

of handy size with good sailing qualities, that will ensure staying. In this case, should the sea breeze overtake a vessel after getting to the eastward of Gun cay, she may stand towards the Palisados till the flagstaff of the Apostles battery is in one with the belfry of Port Royal church, until near Rocky point, when the staff must be kept open to the southward of the belfry to avoid the reef off the point.

Eastward of that point, use the same turning mark until nearly midway between Middle and little Plum points, when the staff of the Apostles battery must not be brought to the northward of the north part of fort Charles, to clear the shoals off the latter point. When Kingston church bears N. $\frac{1}{2}$ W., do not stand farther to the northward than the flagstaff of the Apostles battery in line with that of fort Charles, to avoid the foul ground off Plum point.

In standing to the northward the fall of Salt pond hills on with west extreme of dockyard wall* is a good guide, as it clears all dangers.

Standing to the southward towards Lime cay shoal, do not approach it nearer than to bring the flagstaff at port Henderson just touching Port Royal point; and when standing towards Lime cay, do not come within 2 cables of the north end. When eastward of it, the high cliffs at the south part of Green bay kept open of the north part of Lime cay or Fort Charles flag staff in line with North Shoulder of Salt Pond hill will clear the foul ground to the northward of Maiden rock; and also clears the East Middle shoals. It is seldom large ships work through this channel; the capabilities of the vessel and the force of wind and swell should be considered.

SOUTH CHANNEL is a narrow vein of deep water through the close mass of shoals which lie south and west of Port Royal, and which extend out 4 miles. It is nearly always used by sailing vessels leaving at daylight with the land wind; the buoys on the east side are *red*, and those on the west *red* and *white*.

West Middle rock is a very small head with 23 feet water on it lying directly at the entrance of the channel, S.W. 4 cables from Port Royal point, and N.N.W. $\frac{1}{2}$ W. $2\frac{1}{4}$ cables from the buoy on the north-west end of the West Middle ground. On it there is a floating beacon, with a vane of rails on the top, 4 feet square, 30 feet above the sea; the upper part is painted *white*, the lower *black*, and it forms with the beacon on fort Augusta the leading mark for this channel.*

West Middle knoll, with 27 feet water on it, lies West $2\frac{1}{2}$ cables from the West Middle buoy, and S.W. $\frac{1}{4}$ S. $2\frac{3}{4}$ cables from the beacon on

* See View on chart.

West Middle rock. When on the knoll the martello tower near Rock fort is in one with the south nob on Gun cay; and the beacon on West Middle rock in line with the easternmost cocoa-nut tree on Port Royal point.

West Middle shoal is a coral bank partially covered with a thin layer of sand, and near the centre has as little as 2 feet water on it, steep-to, particularly on the west side. At its north-west end is a *red* buoy, and from it Gun cay is in line with a red patch in the side of the hill at Rock fort about N.E. by E. $\frac{1}{2}$ E.; the flagstaff in the dockyard in line with the military surgeon's house at Port Royal, N.N.E. $\frac{1}{2}$ E.; and the hole in the bluff at Small point in one with Healthshire hummock W.S.W. There is a patch with 5 fathoms water on it S.S.W. 3 cables from the buoy.

Turtle heads are numerous detached rocky shoals, some nearly awash, which extend to the eastward from Small point. A *red* and *white* vertical striped buoy is moored in $4\frac{3}{4}$ fathoms water, on their outer edge, with Kingston church in one with Rackum cay N.E. $\frac{1}{2}$ N., the notch in the mountain open a little to the eastward of the centre part of the largest building in fort Augusta N. $\frac{1}{2}$ E., and the south extreme of Small point in line with a deep gap in the distant hills W.N.W. This part of the channel is about 4 cables wide; the leading mark carries just eastward of a shoal with $4\frac{3}{4}$ fathoms water on it. Should the buoy be adrift, the dockyard clock-tower on with the eastern angle of fort Charles will lead half-way between the shoals and the 27-feet knoll.

Drunkenmans cay.—The eastern side of the South channel is pointed out by this small low cay of stones and sand, the trees on which are much higher and darker than those on the neighbouring islet. A short distance to the northward of it there is a dry sand bore, and from thence it is nearly connected to the south end of the West Middle shoal by rocky ledges in some parts dry and with deep narrow channels between the ledges.

A beacon, 12 feet high, pyramidal in shape and painted red, has been placed near the centre of the coral patch (awash) lying N.N.W. $\frac{1}{2}$ W., distant 2 cables from Drunkenmans cay.

South knolls.—Nearly midway between Drunkenmans cay and the Turtle heads, on the line of the leading mark, are several small detached heads of hard sand, on which there are 27 and 30 feet water.

Portuguese shoals are two small banks at the south-east side of the entrance of the South channel, and about a mile westward of South cays. There are only 6 feet water on the easternmost, 17 to 23 feet on the other, and a *red* buoy with a staff and vane is moored in 5 fathoms water on the

western edge, with the remarkable notch in the mountain touching the east part of fort Augusta N. $\frac{1}{4}$ E., and Healthshire beacon in line with Healthshire hummock W. $\frac{1}{2}$ N.; the beacon is *white*, and close to the beach in Half-moon bay. The channel is here half a mile wide, and the west side is formed by Bush reef, on which the sea generally breaks.

Three-Fathom banks are two detached banks lying off the south-east end of Bush reef, at the south-west side of the entrance to the South channel; the outer is S.S.W. $\frac{1}{2}$ W. $7\frac{1}{2}$ cables from the Portuguese buoy. The least water on the inner bank is 19 feet, on the other 18 feet. Vessels after passing the Portuguese shoal should steer well to the eastward and take care not to get to leeward on these banks, or Wreck reef. There are other patches southward of these; the shoalest has 5 fathoms water on it.

A buoy with cage, painted red and white in vertical stripes, is now moored in $3\frac{1}{2}$ fathoms on the east side of Three-fathom bank; it bears S.S.W. $\frac{3}{4}$ W. from Portuguese shoal buoy, distant $7\frac{1}{2}$ cables.

Wreck reef lies about one mile off the point of the same name, and S.W. $\frac{1}{2}$ S. $4\frac{1}{2}$ miles from the Portuguese shoals. Should the vessel be drifted to leeward and unable to weather this reef, she may run round its north end and anchor close to leeward of it, to await the land wind to carry her out again. The south entrance should not be used. A shoal with a depth of $4\frac{1}{4}$ fathoms lies N.E. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles from Wreck reef.

California bank.—This bank is $2\frac{1}{2}$ miles long in a north-west and south-east direction, one mile broad, and composed of coral, sand, and shells; depths of 21 to 27 fathoms were obtained near the centre (in lat. $17^{\circ} 46' N.$, long. $76^{\circ} 47' W.$), 25 fathoms at the north-west and south-east ends, and no bottom at 100 fathoms close to its south-west edge.

The north-west end of California bank lies South 9 miles from Plum point lighthouse, and 3 miles outside the 100-fathoms line of soundings.

Directions.—A vessel leaving Port Royal, and proceeding through the South channel, which is preferable to the Eastern one, with either the land or sea breeze should be under sail with the land wind at day dawn. If, however, she has good sailing qualities, she may leave with the sea breeze, provided she can lay up S. by E. Having passed close to the westward of West Middle rock beacon, keep it in line with the *black* beacon at the south-east angle of fort Augusta, and a notch in the Liguanea mountain N. $\frac{1}{4}$ E.; the latter, however, is difficult for a stranger to recognise, and is frequently obscured; the channel is well marked by buoys and beacons, which are securely moored, and they may be used for leading marks. When Healthshire beacon bears about W. by N. the vessel will be clear of Portuguese shoals, and may be hauled to the wind, or, if bound westward, con-

tinue on the same course clear of the outer shoals of Wreck reef, taking care to keep the Apostles battery well open eastward of Small point until well to the southward.

A vessel will generally have the assistance of a strong outset as far as Drunkenmans cay, when she will meet the usual westerly stream and heavy swell; therefore should the land wind fail at this point, she had better anchor under the south end of the cay during the calm which intervenes, sometimes for several hours, between the breezes, in order to avoid being set on the shoals to leeward. By no means run the risk of having to bring up outside the Portuguese shoals. Should the sea breeze set in before she has cleared the channel and she should be obliged to work out, should, when standing towards the Turtle head shoal, keep the Portuguese buoy open of the Turtle head buoy. If obliged to stand towards West Middle shoal, tack when West Middle rock beacon is in line with the Western end of the wall of Fort Augusta. This mark clears the reefs on the eastern side and also leads through in the deepest water, until Lime and Drunkenman's cays are in one, when the leading mark for the channel can be brought on, the Dockyard clock tower not opened westward of Portuguese buoy will clear the 3-fathoms bank.

Entering by South channel.—When approaching Port Royal from the southward, Salt pond hills bearing north will clear Wreck reefs. Steer up with Dockyard clock tower a little open west of Drunkenman's cay, until South cay comes on with Plum point lighthouse, when the leading mark for South channel may be brought on, and proceed as before directed.

Soundings extend for 4 miles to the southward of the cays, and the edge is very steep, there being in places only 14 fathoms water at a cable within the 100-fathom line. In the fairway of the channel the bottom is generally composed of mud and sand, and occasionally clay, but near the reefs it is sand, with portions of broken coral.

Supplies.—Water, coal, and provisions may be obtained at both Kingston and Port Royal at reasonable prices.

Tides.—It is high water, full and change, at Port Royal dockyard at about 11h. 0m., and the rise and fall is from 10 to 11 inches. There is no regular tidal stream, but in general there is an outset from the harbour and through the south channel at the rate of a quarter to one knot an hour, until as far as Drunkenmans cay, where it takes a more westerly direction, and generally increases in strength. Sometimes it will be found running in this direction at the rate of $2\frac{1}{2}$ knots; a good offing should therefore always be obtained before shaping a course to the westward.

When the land breezes have been strong, and light southerly winds have prevailed during the day for a short period, it often occurs that the

current is running to the eastward in the morning, even as far as the East Middle shoals, when it takes a more southerly direction, and to the southward of the shoals it will be found setting to the S.W. or W.S.W., the strength quite depending on the force of the wind that has been blowing.*

PORTLAND BIGHT.†—The high land of Healthshire terminates at Polink point, about 7 miles to the south-west of Small point. Thence the coast trends to the north-west and sweeps round to the southward, forming between it and Portland point, 12 miles S.W. by W., an extensive bight 8 or 9 miles deep. The shore is skirted by small islets and detached reefs, within which are several excellent anchorages for vessels of moderate draught. The outer part of the bight is also protected by numerous reefs and small low wooded cays, with channels between them capable of admitting vessels of the largest draught. The best channel to enter by is between Pelican and Bare bush cays, through which a vessel will carry from 6 to 8 fathoms water.

Pelican cays.—About 3 miles from the northern shore of the bight are two small low bushy cays, nearly half a mile apart N.N.W. and S.S.E., which lie near the centre of a rocky ledge, 3 miles in length east and west, and one mile in breadth. The ledge generally shows itself, and the west end is dry and steep-to. In the channel to the northward of it the depth is only 3 fathoms.

Bare Bush cay lies S. by W. $\frac{1}{2}$ W. $2\frac{3}{4}$ miles from the Big Pelican, and rises 4 cables within the north-east end of an oval-shaped coral bank of the same name.

Morris shoal, which lies W. by N. $1\frac{1}{2}$ miles from Bare bush cay, is a coral knoll with 4 feet water on it, about one cable in extent, steep-to, with a clear channel about half a mile wide between it and Bare bush bank, and also between it and the north-east end of Portland reef, one mile S.W. of it. On the eastern side of the shoal is a *red* buoy with a staff and cage in 6 fathoms with Bare bush cay bearing S. 72° E., and Portland cay seen between Half moon cays S.W. $\frac{1}{2}$ S.

Portland reefs and cay are $4\frac{1}{4}$ miles in length N.N.E. and S.S.W., and about $3\frac{1}{2}$ miles in breadth from Portland bluff. Half a mile within the south-west end of the reef is Portland cay, a small bushy islet; and about 2 miles N.N.E. of it are two more similar cays, called the Half-moon cays, half a mile apart, N.E. and S.W., and lying half a mile within the north-east point of the bank, which generally breaks in most

* G. Biddlecombe, Master, R.N.

† See Admiralty chart :—Port Royal to Pedro Bluff, No. 256; scale, $m = 0.72$ inch.

parts. On the Portland reefs are many shoals and dangers. The chart will be the best guide, but there is no safe passage through any part of these reefs for any but the smallest vessels.

Pigeon island, the largest of the outer group, lies $1\frac{1}{2}$ miles westward of the west end of the Pelican reef, and N.W. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles from Bare bush cay. It is low, and steep-to on its east and south sides. The north-west side forms a small bay, off which there is anchorage in 7 or 8 fathoms water.

White shoal is a small detached knoll with $2\frac{3}{4}$ fathoms water on it, steep-to, lying North three-quarters of a mile from Pigeon island, W. $\frac{1}{4}$ N. 3 miles from Little Pelican, and with the south side of Round hill just open of Brazaletta hill. A *black* buoy in $4\frac{1}{2}$ fathoms lies on the eastern side of the shoal, with the west end of Little Half-moon cay just open of Pigeon island bearing S. $\frac{1}{4}$ W., and Little Pelican cay East.

Directions.—Vessels bound into Portland bight should have the assistance of a pilot. If coming from Port Royal, having passed well to the southward of Wreck reef, edge to the westward until the north peak of Brazaletta hill bears W. by N. $\frac{1}{2}$ N. This hill cannot well be mistaken, being the northernmost of two remarkable elevations on the western range of mountains, about 800 feet high, with a deep gap or valley between.* Steer in upon this course, and, as the vessel advances, Pigeon island will be seen from aloft on the same line of bearing. The south extreme of this island in line with the north peak of Brazaletta hill W. by N. $\frac{1}{2}$ N. leads through between Pelican and Bare bush reefs, and 2 cables southward of a $4\frac{1}{2}$ -fathom patch lying S. by W. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles from Big Pelican cay.

Old harbour.—If bound to Old harbour—which is the northernmost anchorage in the bight for vessels of moderate draught,—being between Pelican and Bare bush cays, a remarkable hummock will be seen on the northern ridge of mountains, something in the form of a jockey's cap, called Cudjoe hill. When this hummock comes in line with the base of the western slope of the hill at the east end of Goat island, N. $\frac{3}{4}$ W.,* haul up with this mark, and it will lead to leeward of the dry reef at the west end of the Pelican bank, and between it and White shoal, in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water. When the northern Pelican cay bears E. $\frac{1}{4}$ S., steer N.W. by N., so as to pass about half a mile to the south-west of Careening cay. When abreast the latter cay, the wharves of Old harbour will come in sight, and will direct a vessel to an anchorage off them in $4\frac{1}{2}$ or 4 fathoms, between Careening island and the north-east end of the reef which fronts the western shore, and generally shows itself.

* See Views on chart 256.

Longs wharf.—If bound to Longs wharf, which is nearly 2 miles to the south-west of Old harbour, having entered the channel as before, and brought the south side of Round hill (the southernmost of the two hills mentioned before) just open of Brazaletta hill,—which mark leads on the White shoal,—round the latter gradually to the northward, and bring the upper house at Longs wharf in one with the north end of a gap or flat open space in the mountains, N.W. $\frac{1}{2}$ N. This mark will lead through the best opening in the reef in 4 fathoms, which is here a mile from the shore; and when within it anchor, as most convenient, in $3\frac{1}{2}$ or 3 fathoms water.

Salt river is about 4 miles to the southward of Longs wharf. The entrance to the anchorage lies between Long and Salt islands, which are one mile apart. The former is about half a mile from the shore, and bordered by a reef on the east side to the distance of 4 cables. The latter lies about three-quarters of a mile from the shore, and is steep to a cable off on the north and east sides, but is foul on the south side to the distance of 2 cables. There is a narrow channel between it and the foul ground skirting the shore to the westward, but it is better to take that to the northward, which is half a mile wide.

If bound to Salt river, having entered the Pelican channel, and being abreast the cays, it will be better to shape a course so as to pass round the south end of Pigeon island, which is steep to. Thence a N.W. course $3\frac{1}{2}$ miles will lead to abreast of Salt island. Round its north end at the distance of about 2 cables; steer down for the entrance of the river, and anchor off it in 3 fathoms water, with the south side of Pigeon island just in sight to the southward of Salt island. Pigeon island, however, is so low that in a small vessel this mark must be watched from aloft. Large vessels will find a well-sheltered anchorage in 5 fathoms, close up under the north-west side of Salt island.

Peake bay is about $1\frac{1}{2}$ miles southward of Salt island, between Rocky point reef and other reefs which generally show themselves about three-quarters of a mile to the southward of it. It is $1\frac{1}{2}$ miles deep, but being open to the eastward, with strong sea breezes, a heavy swell rolls in. The best holding ground will be found in $3\frac{1}{2}$ or 4 fathoms water, under the northern sandy shore, about a mile within the outer part of the reefs. The entrance bears W. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from Pigeon island.

West harbour is an extensive shallow bight on the north side of Portland ridge, in which there is a depth of only 8 or 9 feet. The channel is half a mile in breadth, and lies between the reefs (which are dry in places) that form the south side of the entrance into Peake bay and those which extend off half a mile from the north-east point of Portland. The

only anchorage for vessels of large draught is just to the westward of the northern reefs in from $5\frac{1}{2}$ to 4 fathoms water, where the holding ground is good.

Directions.—Vessels should leave either of those anchorages with the land wind at early dawn, in order to get clear of the outer reefs before the sea breeze arrives; should it, however, overtake them before they get to the eastward of Pigeon island, they may work out, in moderate weather, either to the northward or southward of it; the former will be the best route, as the water will be smoother. In this case do not stand too far to the southward, and attend to the mark already given for White shoal.

Goat island and Cabrietta point may be approached by the lead, not coming within the depth of $4\frac{1}{2}$ or 5 fathoms. Should it blow hard it will be better to anchor under the lee of Pelican reef until the breeze lulls or the land wind comes off; but if intending to proceed on, pass out between Bare bush reef and Morris shoal, and the leading mark for the northern channel answers the purpose here, viz., Cudjoe hill on with the fall of Goat island hill. It leads, however, so close to the west side of the reef, that when the Half-moon cays come in one (which is the mark for the south-east end of Morris shoal), it will be better to edge a little to the westward, bringing Cudjoe hill open of the fall of Goat island hill until the vessel is to the southward of the reef, or the southern Half-moon bears West, when she may be hauled to the wind.

If unable to lay through, and the sea is smooth enough to allow of working out of the Pelican channel, in standing towards Morris shoal do not bring Bare bush cay to the eastward of E.S.E.; and in approaching the Pelican reef do not open the fall of Brazaletta hill to the northward of Pigeon island. A vessel may stand towards the white water off Bare bush cay to the depth of 5 fathoms, remembering the $4\frac{1}{2}$ -fathoms patch between Bare bush and Pelican cays.

Portland is a ridge of flat wooded land, of moderate height, about 7 miles in length in a W. by N. $\frac{1}{2}$ N. and E. by S. $\frac{1}{2}$ S. direction, $2\frac{1}{2}$ to 3 miles in breadth, and when seen from the eastward has the appearance of an island. The 100-fathoms line is 11 miles from this part of the shore, and it may be approached in the daytime to the depth of $6\frac{1}{2}$ fathoms, at $1\frac{1}{2}$ miles off. A vessel bound to leeward, however, must be careful to keep the land of Portland to the northward of West, to avoid the cays and reefs just described, which are somewhat hidden by the eastern point. The current generally sets strong to the westward, and although the soundings are regular, a vessel at night should not come within the depth of 12 fathoms.

Rocky point, about W. by N. $\frac{1}{2}$ N. 6 miles from the south point of Portland, and the west end of the table land of the same name, is foul to the distance of three-quarters of a mile to the south-west. A bank called Robertson shoal extends westward and north-westward of the point for a little more than one mile, 6 feet being the least water on it.

Carlisle bay* lies immediately to the northward of Rocky point, and for small vessels is sheltered with the usual breezes as far round as S.E. Anchorage will be found off the wharf, on about a N.E. bearing, and Rocky point about S.E. by E. $\frac{3}{4}$ E., in from 4 to 5 fathoms water. A shoal with 2 fathoms water skirts the shore about three-quarters of a mile off. Westward of Robertson shoal, in $5\frac{1}{4}$ fathoms, is a red buoy with staff and ball, with the wharfinger's house bearing N. by W. $\frac{1}{4}$ W., and Rocky point E. by N. $\frac{1}{4}$ N.

Directions.—Entering Carlisle bay, Robertson shoal should not be rounded until Kemp hill is open west of the wharfinger's house bearing N. $\frac{1}{2}$ W., when the vessel may haul up N.W. by N., and anchor according to draught.

The coast from Carlisle bay sweeps inwards with a deep bend to the north-west as far as Alligator point, which bears W. by N. $\frac{1}{2}$ N. 17 miles from Rocky point; Milk and other rivers empty themselves in this bight. A black buoy with staff and cross, marking the eastern limit of the ballast ground off Milk river, lies in 4 fathoms about a mile off shore, with the highest peak of Round hill bearing N. $\frac{1}{4}$ W. 2 miles.

A white beacon in the shape of a diamond, on a staff 44 feet high, has been erected on the east bank of this river near the mouth. The beacon is visible from a distance of 8 miles between the bearings of North and N.W.

The coast†† from Milk river entrance trends W. $\frac{1}{4}$ S. 9 miles to Alligator point; between Milk river and Alligator hole, at $2\frac{1}{2}$ miles to the westward of it, the shore is composed of red and white cliffs 50 feet high, thence to Alligator point, sandy beach.

At $3\frac{1}{4}$ miles westward of Alligator hole there is a small stream named Gut river, which may be recognised by a remarkable bare space on the steep rising ground over it.

* See Admiralty plan :—Carlisle bay, scale, $m = 2$ inches, plans of anchorages, No. 459.

† The description of the south coast between Milk river and Black river, and north-west and north coasts of Jamaica is from Lieutenant T. F. Pullen, R.N., Admiralty Surveyor, 1876–9.

‡ See Admiralty charts :—Jamaica, with views, No. 446; Kingston to Parattee point No. 256; and anchorages in Jamaica, No. 459.

Alligator point is 30 feet high, whence the land rises to a height of 2,000 feet at a distance of $2\frac{1}{2}$ miles in a northerly direction.

Brune bank, about one mile in extent and rocky, with $4\frac{1}{2}$ fathoms on its shoalest part, lies S.W. $\frac{1}{2}$ S. $9\frac{1}{2}$ miles from Milk river, and S.S.E. $\frac{1}{4}$ E. 8 miles from Alligator point.

Soundings.—The edge of the bank of soundings lies 17 miles southward of Milk river, and 14 miles southward of Alligator point; there are depths of 20 fathoms near the edge, and no bottom at 100 fathoms close to.

Alligator reef.—This rocky bank is about $1\frac{1}{2}$ miles long E.N.E. to W.S.W., and dry in places, the small rocky heads just showing above water; it is situated $2\frac{1}{2}$ miles to the southward of Alligator point, should be given a wide berth at night, as 9 and 10 fathoms, near its outer edge (which is steep-to), are the uniform depths at that distance from the coast. Between the east end of the reef and Alligator point (which may be passed within half a mile) there are 5 to 7 fathoms.

Beacon.—A beacon, about 20 feet above high water, consisting of an iron tripod surmounted by a cap coloured red and white in horizontal bands, is placed on the north-east part of Alligator reef, with Pedro bluff bearing W. $\frac{3}{4}$ N., and Alligator point N. by E. $\frac{1}{4}$ E.

Alligator Pond bay.—Between Alligator point and Little Pedro point, $3\frac{1}{4}$ miles W. by N. from it, lies Alligator Pond bay; the shore of this bay for a distance of $2\frac{1}{4}$ miles westward of Alligator point is rocky with low cliffs, thence to Little Pedro point sandy beach, the land behind rising precipitously to 800 feet.

Anchorage.—The anchorage in Alligator Pond bay is in $4\frac{1}{2}$ fathoms (mud bottom), about half a mile from the wharf near the centre of the bay; it is sheltered from the eastward by Alligator reef, but with westerly and south-westerly winds a heavy swell rolls in, when the shore should be cautiously approached on landing, so as to pass close to leeward of some rocks that lie in the same line of direction as the wharf, at a distance of 100 yards.

Little Pedro point, 20 feet high, is a rocky ledge projecting 200 yards from the shore, the land behind rising suddenly 900 feet, thence gradually to 1,670 feet at a distance of 2 miles North.

The coast from Little Pedro point forms a small bay to the westward, in which there is an indifferent landing, thence it trends W. $\frac{1}{4}$ S. $7\frac{1}{4}$ miles to Pedro bluff. About 3 miles west of Little Pedro point lies Cutlass point, and midway between them there is a large whitish triangular spot (named the White Horses) at a height of 600 feet, on the cliffs which

rise 1,000 feet nearly perpendicular from the sea; half a mile westward of the White Horses there is a remarkable white spot 500 feet above the sea.

The land over Cutlass point rises abruptly 1,750 feet, thence gradually 2,400 feet to mount Bellevue at $2\frac{1}{4}$ miles northward of Cutlass point; between this point and Pedro bluff the coast curves slightly to the northward, forming Jacks hole.

A rocky ledge, awash, fringes the coast between Little Pedro point and Pedro bluff, except under the White Horses.

Pedro Bluff is a prominent headland, rising abruptly 220 feet from the sea, and sloping to 70 feet at two-thirds of a mile inshore, whence the land again rises gradually to 1,780 feet northward of the bluff.

Soundings.—From the edge of the bank of soundings at 6 miles south of Pedro bluff there are depths of 20 to 17 fathoms 3 miles in a northerly direction, thence 26 fathoms to within one mile of the shore, where there are 20, decreasing to 17, 12, and 8, with 6 fathoms close to Pedro bluff.

Pedro bay, in which temporary anchorage may be obtained in $4\frac{1}{2}$ fathoms (sand and mud), is situated on the west side of Pedro bluff; there is occasionally a heavy swell in this bay, especially after a continuation of easterly or south-easterly winds, when the depth of water in the bay decreases 2 or 3 feet. Landing is not at all times good.

The coast from Pedro bay trends N.W. $\frac{3}{4}$ W. $3\frac{1}{2}$ miles to Black Spring point, with several indentations, the largest of which is Frenchman bay; this part of the coast is reef-bound, with the exception of one or two passes known to fishermen and to the pilots residing along the coast, who look out for vessels making the pilot signal.

From Black Spring point, which has on it a low sand heap, the land rises 500 feet to Sand Hill range, at a distance of three-quarters of a mile to the north-eastward.

Starve Gut bay is situated about midway between Black Spring point and Parattee or Sand Hill point 4 miles N.W. by W. $\frac{1}{2}$ W. from it; a ledge of reefs awash extends round the shore of this bay, except in the north-east part, where there is a small sandy beach, from which a morass commences, and extends between the sand hills (30 to 40 feet high) that fringe the coast line, and Sand Hill range, to beyond Black river.

Anchorage.—Starve Gut bay affords a temporary anchorage in 4 fathoms half a mile from the shore, and is used occasionally by small

vessels bound to the eastward when unable to work against the current, which, after a continuation of easterly winds, sets from one to $1\frac{1}{2}$ knots an hour to the westward.

Parattee or Sand Hill point, from which the coast trends N. $\frac{3}{4}$ W. to Black river, is low, having on it a few palm trees; the coast reef projects three-quarters of a mile westward from this point, and extends in a northerly direction as far as the line of reefs that protect the anchorage off Black river.

Soundings.—About 4 miles south of Cutlass point the outer edge of a deep commences and extends to the westward, nearly parallel with the shore; in the eastern part of this deep, which is 2 miles broad, there are 20 fathoms, deepening to 29 fathoms abreast Black Spring point, where the breadth is one mile; between the deep and the edge of the bank of soundings there are 22 to 19 fathoms; at 7 miles South of Parattee point there are 20 fathoms on the edge of the bank, and no bottom at 100 fathoms close to the southward.

Banks.—Blossom bank, situated 10 miles south of Luana point (south coast of Jamaica), extends over a space of about 16 square miles, and has on it depths varying from 18 to 26 fathoms; it is separated from the bank extending from the south coast of Jamaica by a deep channel about $1\frac{1}{2}$ miles in breadth.

New bank, on which there is a depth of from 15 to 23 fathoms, is situated 8 miles W.S.W. from Luana point, and covers about 13 square miles. Both these banks are of coral formation.

Black River anchorage.*—Between Parattee point and the mouth of Black river, $4\frac{1}{2}$ miles distant, the coast extends North for 2 miles, and then, trending to the north-east and north-west, forms a bight, nearly in the centre of which is the entrance of Black river.

Moco point, $1\frac{1}{4}$ miles westward of the river entrance, is formed of large mangrove trees 25 to 30 feet in height. Between this and Malcolm point, distant a mile W. by N., is Hunt bay, fringed with mangrove trees.

Commencing at the beach under the court-house—a large two-storeyed building with portico in front and wings connected by archways—and gradually extending its distance to a quarter of a mile off Moco point, extends a reef, which thence follows the coast line into Hunt bay. Malcolm point has also a small fringing reef.

Malcolm bay, between Malcolm point and Long Acre point, has good temporary anchorage for vessels waiting for a pilot.

* See Admiralty charts:—West Indies, sheet 4, No. 486; Jamaica, No. 446; and plan of Black river anchorage on chart No. 448.

From Long Acre to Burnt Ship point, one mile West, is a sandy beach, off which Doctor reef and other foul ground extends seaward half a mile. Thence to Luana point, W.N.W. a mile, are sandy beaches and rocky ledges alternately.

Soundings.—From 7 miles south of Parattee the edge of the bank extends N.W. for 10 miles, and then directly for Luana point North 5 miles. From thence to the north-westward the shore is steep-to, there being no soundings with 100 fathoms of line within one mile of it.

Shoals and reefs.—Off Parattee point the foul ground gradually increases its distance from the shore from a quarter of a mile to $1\frac{1}{2}$ miles, where the bay commences to trend to the N.E. Thence the foul ground, including Barrack and Ravient reefs, which have several patches and sharp heads of rock, extends to the W.N.W. 2 miles: according to local information these are rapidly growing. In-shore of Barrack reef extend the Inner Barrack reefs, having 2 and $2\frac{1}{4}$ fathoms to within 8 cables of the hospital, which was formerly used as barracks.

A coral patch about half a cable in diameter, and having over it a depth of 6 feet, is situated at the eastern part of Black river anchorage.

From this shoal, Black river church bears North distant $1\frac{2}{10}$ miles, and Pynado or Crane wharf E. $\frac{1}{2}$ S. distant $1\frac{2}{10}$ miles.

Directions.—In entering Black river bay, Pedro bluff bearing S.E. by E. $\frac{1}{4}$ E. and open of Blacksprings point, leads clear of the reefs off Parattee point. Blacksprings point open of Parattee point S.E. $\frac{3}{4}$ E. clears Barrack and Ravient reefs. The east side of the trees at Malcolm point, N.E. $\frac{3}{4}$ N. in line with the west end of the sand in Hunt bay, and the highest point of the hills behind, leads westward of the reefs in $4\frac{1}{2}$ fathoms water. (*See view A. on chart.*)

The church, E. by N. $\frac{1}{4}$ N., in line with the north shoulder of Santa Cruz mountains, and a little south of where they cut the hills behind them, leads to an anchorage in $4\frac{1}{2}$ fathoms, sand and mud, with Hodges wharf bearing North. To a vessel approaching from the westward this mark leads clear of all shoals.

Vessels may anchor off the town in 3 fathoms, mud, with the church bearing N.N.E. distant 7 cables. The clearing mark for the east side of Inner Barrack reef is the south end of the trees at Malcolm point N.W., $\frac{3}{4}$ W., in line with two large cotton trees to the southward of Font Hill house. During strong westerly and south-westerly winds a heavy sea rolls into the anchorage, making landing difficult and at times impossible.

Pilots take schooners of light draught and occasionally larger vessels in ballast to the anchorage by passing close to the eastward of the Barrack and Inner Barrack reefs.

Ballast ground lies to the west of a north and south line, drawn through a large white house midway between the church and court-house, and in less than 10 feet of water.

Black river flows from the north and east, through a large morass, and is navigable for 30 miles of its course; beyond are rapids and falls. There is a bar close to the river mouth, having $1\frac{1}{2}$ to 4 feet on it, the depth varying with the strength of the outpour. The water is fresh 3 to 5 miles up the river, according to the season of the year. The river abounds with fish and alligators.

The town of Black river stands on the west side of the river facing the bay, its church, court-house, and hospital being conspicuous from seaward. It has a population of about 1,200, and, as a shipping port, it ranks third after Kingston. Poultry and yams are plentiful; fresh meat on Saturdays only. About 40 vessels visit this port annually; the exports are 1,000 hogsheads of sugar, and 700 puncheons of rum. Vessels always leave here, as also all other ports in Jamaica, before August 1st, as after that date the insurance is doubled in consequence of the hurricane season beginning.

The sea water at Black river has a milky appearance, due to the nature of the bottom (fine sand and clay), while at Savannah-la-Mar, 20 miles to the N.W., it is perfectly clear, enabling the bottom to be seen in 8 fathoms.

Coast.—From Luana point the coast trends N.W. by N. for a distance of $2\frac{3}{4}$ miles to White House point; it is steep-to and clear of off-lying dangers, the depth of 100 fathoms being found at about a mile off shore.

Scott cove (or Seals'), a small but well-sheltered loading place for cargo boats, lies about midway between Luana and White House points; the entrance is not easily recognised by strangers.

There is a limited anchorage off the entrance to Scott cove in 7 fathoms, sand and rock, with the large trees on mount Edgecumbe open of White House point; this anchorage is not recommended, and should not be taken up without a pilot.

Anchorage.—Vessels may anchor off White House point in 7 fathoms, mud, with that point bearing East distant 2 cables; the soundings decrease rapidly from the edge of the bank, but the holding ground is better than that off Scott cove.

A pilot should be employed, as the anchoring ground is of small extent. Vessels occasionally load at this anchorage, but their cargoes are more usually conveyed in cargo boats to Black river or Savannah-la-Mar for shipment.

Pimento point, situated N.W. $\frac{1}{2}$ N. from White House point, distant nearly 3 miles, has a reef extending a short distance from it;

between White House and Pimento points the coast is fringed by off-lying reefs, on the south side of which the depth rapidly increases.

Parker bay, situated one mile eastward of Pimento point, affords good anchorage for small vessels within the outer reefs, the channel through which, though not long, is narrow, and carries a depth of $2\frac{1}{2}$ fathoms; the basin inside deepens to $3\frac{1}{4}$ fathoms over sandy bottom.

Leading marks.—To proceed through the channel between the outer reefs, bring the east extreme of Wharf house in line with the western of two towers (which stand on a grassy slope half a mile inland) bearing N. $\frac{1}{2}$ E.

Coast.—From Pimento point the coast trends N.W. by W. for $1\frac{2}{3}$ miles to Crab Pond point, which has a reef extending from it, and then N.N.W. for $1\frac{1}{2}$ miles to Belmont point.

Moor reef.—This danger lies three-quarters of a mile N.W. $\frac{1}{2}$ W. from Crab Pond point and three-quarters of a mile off shore.

Black Spring point, open west of Luana point, bearing S.E. $\frac{1}{2}$ E., leads nearly a mile south-west of Moor reef.

Blewfields,* about $2\frac{1}{2}$ miles northward of Crab pond point, may be known by the church, schoolhouse, and the buildings on a large estate. The anchorage is within the rocky ledge which lies about $1\frac{1}{2}$ miles from the shore, and has a depth across it of $3\frac{1}{2}$ to $4\frac{3}{4}$ fathoms; Luana point just open leads westward of it.

Water may be obtained at a small stream in Blewfields bay, but a more convenient place will be found round the bluff, at the north end of the bay.

Directions.—Standing in for the anchorage keep the overseer's house in line with the southern and lowest part of a deep hollow in the mountain bearing E.N.E., which leads across the ledge in $3\frac{1}{2}$ fathoms. As the water is very clear, any dark spots may be seen and avoided. When the ledge is crossed, keep to the northward with the Wesleyan chapel about N.N.E., for the anchorage in about $5\frac{1}{2}$ fathoms. Vessels of large draught may anchor close to the west side of the ledge in 9 or 10 fathoms, but it must be approached cautiously under easy sail, as the ledge is steep-to. The land in this neighbourhood is lofty, and $2\frac{1}{2}$ miles inland rises to the height of 2,000 feet.

The soundings in this bay are irregular, over sand, rock, and weed.

The best anchorage is in 5 fathoms, with the Wesleyan chapel on Friars cap bearing N. $\frac{3}{4}$ E. and the overseer's house bearing E. by N.

* See Admiralty plan :—Blewfields anchorage, No. 458; scale, $m = 2.8$ inches.

The overseer's house (which has a verandah) is situated on a hill about 150 feet high and a quarter of a mile inland.

Bluff or Paradise point, situated N.W. of Belmont point distant $4\frac{1}{2}$ miles, projects a third of a mile from the line of coast, and has a reef extending from its southern extremity.

From Bluff point the reefs which form the south side of Savannah-la-Mar anchorage extend in a W. by S. direction.

SAVANNAH-LA-MAR* may be readily distinguished by the town which stands on the shore of a low and flat plain of considerable extent. The ridge of hills bounding this plain on the north is very remarkable, and one of the peaks, called the Dolphin head, 3,450 feet high, also serves as a guide to the locality. The anchorage is formed by a line of reefs running along shore, and abreast the town about $1\frac{1}{2}$ miles off, with channels between them.

About 100 vessels visit this port annually. The exports in the year are 4,500 hogsheads sugar, 2,600 puncheons of rum, 5,000 tons of logwood, 110,000 cocoa-nuts, besides ginger, coffee, and pimento.

The most conspicuous object in this town is a ruined fort at its southern extremity.

A beacon is erected on the shore at the edge of the mangroves, 700 yards eastward of the fort; it is an inverted triangle of grating work painted white, and is very conspicuous.

South-east channel is a narrow opening in the outer reef about 70 yards wide, between a steep rock on the eastern side with less than 6 feet water on it, and two shoals of 10 feet and 6 feet water on the western side.

The beacon in line with the east side of Dolphin head, bearing N. by W. $\frac{1}{4}$ W., leads through South-east channel in a depth of 19 feet, smooth water.

Within this channel the depth increases to $3\frac{1}{2}$ and 4 fathoms, over a bottom of sand and mud, shoaling gradually to the shore.

Lee passage, situated $1\frac{3}{4}$ miles westward of South-east channel, is 4 cables wide, and has in it a depth of 4 fathoms.

The western side of Lee passage is formed by a shoal (known as "Broad Stag" shoal, close south of which a red buoy is moored in $4\frac{1}{2}$ fathoms of water,) of 9 feet situated 2 cables eastward of Great breaker, and the eastern side by a coral reef with from 2 to 3 fathoms over it.

West point open south of St. John's point, bearing W. by N. $\frac{3}{4}$ N., leads two-thirds of a mile south of Great breaker.

A detached house on the beach, three-quarters of a mile westward of the fort, in line with a round hill (the highest which is seen eastward

* See Admiralty chart :—No. 448, with plan of Savannah-la-Mar anchorage; scale, $m = 2.95$ inches.

of Dolphin head) bearing N. $\frac{3}{4}$ E. leads through Lee passage in mid-channel.*

Vessels of light draught approaching from the westward can proceed to an anchorage immediately south of the town by bringing the beacon in line with a notch in the distant hills bearing N.N.E. $\frac{3}{4}$ E.; this mark leads in $2\frac{3}{4}$ fathoms between two shoals situated about 6 cables south of the fort.*

When passing through Lee passage, the notch should be kept open west of the beacon, and when proceeding between the two shoals it should be kept open just east of it.

The marks here given, except the beacon and Dolphin head, are not readily made out by a stranger. The Great breaker always breaks.

There are several clear passages among the outer reefs between South-east channel and Lee passage. The one next west of the south-east channel has a *red* buoy in 4 fathoms water, on the north-east edge of the shoal that forms the south-west side of the channel. A *red* buoy is also moored in 18 feet on the southern edge of the shoal (known as the Fifty-six shoal), between the latter buoy and the Fort.

Supplies.—Provisions can be obtained at Savannah-la-Mar, but the best watering places are those situated in Blewfields bay.

If a berth is taken up outside the reef, be very careful in approaching, as it is steep-to. With a strong trade this anchorage is by no means desirable, and risk will be run of losing an anchor. The west side of the plain of Savannah-la-Mar terminates a short distance north-west of St. John's point, and from thence to South Negril point the land is of moderate elevation.

Coast.—Between Savannah-la-Mar and St. John's point the coast is fronted by an extensive bank of soundings, on which are numerous coral heads of from 2 to 3 fathoms.

Vessels when approaching this part of the coast should on no account get into soundings, unless intending to anchor off Hope wharf, situated $1\frac{3}{4}$ miles eastward of St. John's point, which should not be done without the aid of a local pilot.

Between St. John's point and West point the only places where landing can be effected are at Little bay and Homer's cove, situated $2\frac{1}{4}$ and 3 miles respectively north-west of St. John's point.

Negril (or Long) bay.—South Negril point, the extreme west end of Jamaica, is bold, round, rocky, and steep-to, and between it and North Negril point, which bears N. $\frac{3}{4}$ E. 6 miles, the shore recedes and forms Negril or Long bay, about $1\frac{1}{2}$ miles deep. The edge of soundings

* See View on chart. This mark is not easily made out until the bearing is quite on; it must be used with caution.—Commander Papillon, H.M.S. *Bullfrog*, 1885.

runs nearly North from the former point, and extends out about 2 miles from the head of the bay.

Sandy reef, a circular reef a third of a mile in diameter, lies N. by E. $\frac{3}{4}$ E. from South Negril point, distant $2\frac{3}{4}$ miles; rocks and foul ground occupy the space between Sandy reef and Booby cay.

Anchorage.—Vessels can anchor in Negril bay in 4 to 5 fathoms, sand and rock, with South Negril point bearing S. by W. $\frac{1}{2}$ W. distant $1\frac{1}{2}$ miles, and the westernmost houses on the beach, situated nearly one mile within that point, bearing S. by E.

Booby cay lies a quarter of a mile off shore, about $1\frac{1}{2}$ miles to the southward of North Negril point, and the coast between forms a small bay, called Negril harbour, which, however, is seldom visited even by droghers, and cannot be recommended as a safe anchorage. The ground both northward and westward of the cay, for half a mile, is foul with rocky heads.

Pedro point.—From North Negril point the coast, which is bold and steep-to, takes a north-east direction for 10 miles to Pedro point, a bold, prominent cliff which forms the north-west extreme of the island, and is somewhat similar to Pedro bluff.

Coast.—From North Negril point the coast, which is cliffy and about 50 feet high, trends N.N.E. for a distance of $1\frac{1}{2}$ miles to Orange point; this extent of coast is clear of off-lying dangers.

Orange islet is a small islet lying close to the coast at half a mile eastward of Orange point; foul ground extends from it to the eastward.

Orange bay, situated one mile eastward of Orange point, recedes about half a mile, but is too shallow to afford anchorage; the entrance to this bay is foul.

Coast.—Between Samuel point, the eastern entrance point of Orange bay, and South-west point, which bears from it N.E. by N., distant $1\frac{1}{2}$ miles, the coast is composed of sand and rock.

Rhodes bay is the local name of an indentation lying midway between these points; temporary anchorage may be obtained off this bay in 8 fathoms, sand and rock, with South-west point bearing N.E., Samuel point S. $\frac{1}{2}$ W., and Orange point S.W. by W.; the edge of the bank on this part of the coast is steep-to.

Green Island harbour* is a small cove about $2\frac{1}{2}$ miles north-east of Orange bay. It is about three-quarters of a mile deep, and little more than a cable wide between the reefs which skirt the shore on either side of the entrance, and is only fit for vessels of light

* See Admiralty plan:—Green island harbour with view, No. 459; scale, $m=4$ inches.

draught. Being open to the northward, a heavy sea rolls in with these winds, rendering loading or unloading impossible, and bringing in sand which is said to be gradually filling it up.

Directions.—To enter this harbour bring the western side of a yellow house, situated on the beach at western side of the head of the harbour, in line with a house on a hill about 350 yards south of it, bearing S. by E. easterly; this mark leads close to the western edge of the reef which forms the east side of the harbour. On this line a vessel will carry a depth of $5\frac{1}{2}$ fathoms between the reefs, and being within them she may anchor according to draught. The soundings gradually decrease towards the shore, and with the inner wharf on the eastern side bearing East the depth will be only 15 feet; within this it shoals rapidly to 9 feet, with the fort on the west point bearing West.

Coast.—Between the eastern entrance point of Green island harbour and Lances point, a distance of 3 miles in a north-easterly direction, the coast is indented by three small bights, known as Negro bay, Davis and Cousin coves.

From Lances point the coast, with two small indentations, trends N.E. $\frac{1}{2}$ E. for $1\frac{1}{2}$ miles to Pedro point, and then in a more direct line a low rocky coast with hills rising behind it trends east for $2\frac{1}{2}$ miles to the west entrance point of St. Lucea harbour. Pedro point is steep-to, but eastward of it the bank shoals more gradually to the shore.

Davis cove is a temporary anchorage for droghers, lying about $2\frac{1}{2}$ miles north-east of Green island. All this part of the shore, with the exception of the immediate vicinity of Green island, which is low and surrounded by reefs, being bold and steep-to, a vessel may stand to within a mile of it.

St. LUCEA HARBOUR,* nearly 4 miles eastward of Pedro point, although of small dimensions, is one of the best harbours on the north side of Jamaica. Its entrance is about 3 cables wide, but within it sweeps round into a most picturesque basin about three-quarters of a mile in diameter, capable of receiving vessels of the largest size. Its position may be readily recognised by the fort, church, and barracks which stand near each other on the western side of the entrance. From an offing it will be found by bringing the Dolphin head to bear about S. $\frac{1}{2}$ E.

Lucea point is a low, rocky headland skirted by a ledge for half a cable, and the eastern shore within it as far as Cane point is also foul to the distance of one cable. A reef, which breaks, runs off S.E. by E. one cable from the fort on the western side; the western shore is also foul to about the same distance.

* See Admiralty plan :—St. Lucea harbour, with view, No. 459; scale, $m = 4$ inches.

Hospital reef extends about 2 cables to the northward of point Antonio; the great house at point Estate, touching the southern cliffs of Lucea point E. $\frac{1}{4}$ N., leads northward of it.

Directions.—Approaching St. Lucea from the westward there is no danger except the Hospital reef, but in running down from the eastward keep a good offing until past Buckners reef, which lies about half a mile from the shore, and $2\frac{1}{2}$ miles eastward of the harbour. Marly hill house shut in by the fort clears Honeycomb reef, but there is no object in rounding Lucea point closely. Having opened the harbour, steer in mid-channel and when the court-house comes open of Marly hill, edge away to the south-west and anchor as convenient. A good berth for a heavy ship is with the fort bearing N.N.W. and the court-house (painted yellow, with a clock) in line with the Baptist chapel W. by S. in $5\frac{1}{4}$ fathoms water. Farther eastward a vessel will be exposed to northers, which at times send in a heavy sea. Vessels loading may go as far in as to bring the fort N. $\frac{1}{2}$ E. in $3\frac{1}{2}$ or 4 fathoms water. The bottom is mud. Should a vessel have to work out, in standing towards the eastern shore do not go farther than to bring the house on Barbara hill in line with a house above it on Thorn hill; but tack short of this line, especially near Cane point, as it leads close to the coral bank.

To pass eastward of the reef extending eastward from Antonio point, the west point of entrance, bring a detached house about 100 feet above the level of the sea, and situated a quarter of a mile west of Thorn hill, in line with Dolphin head, bearing S. $\frac{3}{4}$ E., but it is a very close mark. (*See* view on plan 459). The edge of the reef off the fort is, however, plainly visible, so that vessels can steer round it and anchor as convenient.

Buoy.—A conical-shaped buoy, painted white, is moored in $2\frac{1}{2}$ fathoms on the edge of Pit bank, with the south-east extreme of the fort bearing N.N.E. $\frac{1}{4}$ E., and Morley hill house W. $\frac{1}{4}$ S.

Supplies are good and water may be procured from the town, or at a well to the northward of Georgia river on the east side of the harbour, at from 4 to 2 shillings per ton.

Coast.—Between Lucea point and Mosquito cove the coast is low, and composed alternately of sand and rock, with a bank of soundings extending to seaward for a distance of about half a mile. South of Lucea point, at a distance of one mile inland, the hills attain an elevation of 800 feet.

Mosquito cove,* about 3 miles to the eastward of St. Lucea, is a narrow well-sheltered inlet capable of receiving vessels of large draught. It is about a mile in length north and south, but at its entrance

* See Admiralty plan :—Mosquito cove, No. 459; scale, $m=4\cdot0$ inches.

between the reefs, which skirt it at a short distance on either side, it is little more than half a cable wide; it however gradually widens within, and at its inner end forms a basin about 3 cables in diameter, in which the depth is from 3 to $2\frac{1}{2}$ fathoms. A vessel will sail in with the sea breeze, but as no marks can be given, and the cove being so narrow, the assistance of a pilot will be required. In approaching, avoid the Buckners reef, which lies about three-quarters of a mile north-west of it at a long half mile from the shore, with a channel of 6 fathoms within it. A vessel may pass round either end of this reef, and soundings will be found half a mile outside it.

Round Hill bluff.—The bank of soundings to the depth of 100 fathoms extends about half a mile north of Round Hill bluff. Reefs extend about half a mile from the shore between Mosquito cove and Round Hill bluff, and when working along this part of the coast, a vessel should tack before striking soundings.

Great river discharges itself into a small bay at about a mile to the eastward of Round Hill bluff, a remarkable bold wooded headland, about $5\frac{1}{2}$ miles to windward of Mosquito cove, and the same distance to leeward of Montego bay. It is protected on the north by a reef, within which there is anchorage for two or three vessels of moderate draught. The anchorage off this river is used as a quarantine station for Montego bay: the river may be recognised from the offing by a red bridge which spans it. In the event of being caught by a norther in the bight of Montego bay, and not able to fetch that anchorage or weather Round Hill bluff, which is foul for nearly half a mile off, a vessel may run for this place as a last resource by observing the following directions.

Directions.—Being off the anchorage, steer in for it on about a S.S.W. bearing, and having made out the point of the reef, which shows itself, pass close round it, leaving it on the port hand; then luff up, shorten sail, and anchor immediately the vessel is head to wind, as near the reef as possible, as there will be only room to veer out half a cable, and be in 3 fathoms. It will perhaps be safer to drop both anchors at once, to prevent dragging. The river is navigable for flat-bottomed boats to a considerable distance.

MONTEGO BAY.*—From Round hill the shore continues its easterly direction for 5 miles, then bends suddenly to the northward for 3 miles, terminating in a low gradually rounding point, which may be said to form the north end of Montego bay. The head of this bight is filled with low mangrove cays skirted by reefs to the distance of a quarter of a

* See Admiralty plan : —Montego bay, No. 459 ; scale, $m = 4$ inches.

mile, almost wall sided, with 20 fathoms water at about half a cable off. To the northward of the cays the low shore (on the north end of which will be seen the town) sweeps round with a slight inward curve, forming the bay, which between the reefs is nearly three-quarters of a mile wide north and south, and from the town to the edge of soundings about three-quarters of a mile deep.

The north and east sides of the bay are also foul to the distance of 2 cables, and in the north-east corner there is a small secure cove formed by a break in the reef, capable of holding 10 or 12 vessels. Between the town of Montego and Sandy point the coast is formed by a rocky cliff about 20 feet high.

On the eastern side of the harbour, northward of the town, are the remains of a former breakwater, part of which is above water.

The ballast ground, situated in the south-west part of the bay, is marked by a small red conical buoy with staff, moored in 7 fathoms water, at 7 cables S. by W. from the Marine hospital, situated on Old Fort point, and which is a conspicuous object.

The anchorage in the bay is quite safe during the period of the ordinary land and sea breezes, which range from N.N.E. to S.E.; but between November and March, when northers sometimes blow in accompanied by a heavy sea, a second anchor may have to be dropped, and accidents have occurred.

Supplies.—Water and provisions of all kinds can be readily obtained at Montego.

Directions.—Montego bay being an open roadstead there is no difficulty in getting to the anchorage, except from its generally crowded state, especially from December to June. Approaching it from the eastward run down along the shore at the distance of about 2 miles, hauling gradually round the reefs, in 9 or 10 fathoms, which may almost be skirted by the eye, the water is so clear. Having passed to the westward of the point, haul to the southward along the reef, and when the church comes open bearing E.S.E. the vessel will be southward of the south-west part of the northern reef. Anchor as most convenient, with Sandy point, which is a little northward of Old Fort point, shut in. Sandy point just open of Old Fort point leads along the edge of the bank, which is steep-to. A good berth will be with the church from East to E. by N. and Old Fort point N. $\frac{1}{2}$ W., in $10\frac{1}{2}$ fathoms water. In winter the farther to the northward the berth is taken the better, as the vessel will get the protection of the reef, but the holding ground is not so good. In anchoring be

prepared to veer out a good scope of cable at once, or the vessel may drag off the bank.

The court-house has a white tower and a clock ; it is more conspicuous than the church and is likely to be mistaken for it. The church is nearly hidden by cocoa-nut trees ; it has a dingy-looking steeple and a clock. A new market-place with a belfry is erected near the court-house. The town is the largest on the north side of Jamaica ; about 50 vessels visit it in each year.

The coast from Montego bay takes an E. by N. direction for 6 miles to Duns point, the north extreme of Jamaica, it then trends a little southward of East for 10 miles to Falmouth. This part of the island, as far eastward as St. Ann, is generally low, highly cultivated, and backed by hills of moderate elevation. In beating up from Montego bay, the set of the current should in the first place be found, and taken advantage of accordingly. Should there be none, keep the shore aboard during the evening, which may be done without fear, to catch the land wind. If it is found more advantageous to seek an offing, the mariner will find a good guide as to his progress to windward in the peak of Turquino, the highest and most remarkable mountain on the south side of Cuba, and generally visible.

Between Sandy point (Montego bay) and Falmouth harbour the bank of soundings to the depth of 100 fathoms extends about half a mile from the shore : numerous wharves have been built on this part of the coast, from which produce is conveyed by cargo boats to either Montego bay or Falmouth harbour.

Eastward of Montego bay the hills, at a distance of $1\frac{1}{2}$ miles inland, attain an elevation of 1,000 feet, maintaining generally that height until within 3 miles of Falmouth harbour, toward which they gradually slope.

The shore reef extends generally about 2 cables from the coast, but off Long bay (situated 10 miles east of Montego point) a depth of 3 fathoms is found at a distance of half a mile off shore.

Winds and weather.—When seeking an anchorage off the north coast of Jamaica, the possibility of a gale from the northward should always be borne in mind ; these storms are most prevalent during the autumn and winter months, and are invariably accompanied by thick rain, squalls, and heavy seas.

FALMOUTH HARBOUR* is a reef harbour capable of containing a small number of vessels moored head and stern and drawing less

* See Admiralty plan :—Falmouth, or Martha Brae, No. 451 ; scale, $m=8\cdot0$ inches.

than 16 feet. It may be readily known by the public buildings of the town, which fringes the beach and is of some extent; or by its position near the foot of Gun hill, which at 2 miles inland attains a height of 770 feet and appears conical when seen from the eastward.

The channel through the reefs being extremely narrow and intricate, a pilot is necessary for a stranger; though it is buoyed, yet, as the buoys frequently break adrift, no reliance can be placed on finding them in position; a beacon painted white, in the form of a pyramid surmounted by circular discs (to reflect the sun's rays), stands on the shore close eastward of the town, and greatly facilitates navigation. The land wind (with which only this anchorage can be left) is frequently interrupted for some days, but more especially so during the winter months.

Entrance.—The eastern side of the entrance is marked by a red and white striped buoy placed on the western side of the outer reef, the channel lying between it and West Triangle rock, over which there is a depth of 13 feet water; midway between West Triangle rock and the buoy is situated East Triangle rock, with 19 feet water over it and $5\frac{1}{2}$ fathoms close-to on either side.

Within the entrance the channel deepens to 7 fathoms, with reefs almost awash on either side, and turns S.W. towards the court-house. It runs thus for 2 cables and then turns south and east through either of three channels to the anchorage.

These channels pass on either side of and are formed by Middle or White and Inner or Harbour shoals.

Hopewell rock.—This rock, projecting a slight distance into the channel from the centre of the eastern side, is marked by a beacon consisting of a staff and St. Andrew's cross painted red and white in stripes.

Middle shoal.—This shoal is 80 feet long N.E. and S.W., 40 feet wide, and has 4 feet least water upon it; its south-west extremity is marked by a beacon consisting of a staff and triangle painted white.

Inner shoal.—This shoal, slightly larger than Middle shoal and lying S.W. of it, has also a depth of 4 feet; its south-west extreme is marked by a buoy painted white.

Harbour rock.—At half a cable south of Middle shoal is Harbour rock, a pinnacle having 18 feet of water over it, which rapidly deepens again all round to 4 fathoms.

Spider reef.—This reef, extending from the point near the custom house, forms the southern limit to the harbour.

The following sailing directions for the north coast of Jamaica, between Falmouth harbour and Morant point, are by Lieut. T. F. Pullen, R.N., the officer in charge of the coast survey of the island, 1879.

Directions.—In entering the harbour carry small sail and con from the masthead. Bring the beacon on the coast line eastward of the town bearing S. by W. $\frac{1}{2}$ W. in line with the north-east side of a house one mile inland, and proceed until the south-east corner of the court-house bearing S.W. by W. westerly opens north of the memorial stone of the Baptist chapel behind it, when immediately keep away on that mark and enter the anchorage by the most convenient of the three passages, selecting a good berth in one of the tiers in which vessels are placed. The passage to leeward of Inner shoal should be avoided unless the wind is well to the northward, or a vessel will not shoot far enough to windward to be well clear of Spider reef on taking her cable. If arriving late in the afternoon (when the land wind may be expected at any moment), be prepared with stern moorings or a kedge.

Current.—When the sea breezes blow continuously for some days without the intermission of the land wind, there is at times, owing to the constant beat on the reefs and the amount of water forced into the harbour, a current induced which sets to windward through the anchorage and is strongest with the strongest winds; it is often the case that vessels are riding entirely by their stern moorings with their bower cables hanging up and down, the current being stronger than the wind.

Supplies.—Provisions are plentiful. A water pipe is laid out in the harbour, alongside which two boats can fill at a time. A water rate, according to tonnage, is levied on all vessels entering the harbour.

Ballast and Quarantine ground.—The ballast ground lies off Fort point, to which it must be sent in boats for discharge. The quarantine ground, being at Great river (the same as for Montego bay), renders it necessary to obtain pratique before entering the reefs, departure in a sailing vessel being impossible during the sea breeze.

Coast.—From Falmouth the coast is sandy and rocky alternately, trending East and E. $\frac{1}{4}$ S. for 10 miles and then receding and forming the bay into which Rio Bueno empties itself; the small town of the same name being situated in the south-west corner of the bay. The 100-fathoms line of soundings along this part of the coast lies barely half a mile off shore, whilst immediately inland a gradual slope commences, attaining its highest point, 300 feet, about half-way between Falmouth and Rio Bueno, towards which latter bay it again gradually falls; at 2 miles inland a range of hills from 800 to 1,000 feet high extends eastward from Martha Brae river as far as the gorge of Rio Bueno.

Rio Bueno, once an important shipping roadstead, may be recognised by some remarkable slate-coloured bare patches on the face of bluff table-topped cliffs of from 100 to 150 feet elevation, lying one mile eastward of it; or by the church and houses in the south-west corner of the bay. Rio Bueno recedes three-quarters of a mile and is very deep, except in its south-east corner, where a narrow mud bank, with 8 or 9 fathoms on it, affords anchorage close to the shore; this bank is steep to outside and with deeper water again between it and the beach. It is not advisable to attempt this anchorage without a pilot or having previously sent in a boat to mark spots for each anchor. Mooring is recommended as the only protection against northers or severe weather, and is necessary at all times with more than two vessels on the bank, in addition to a kedge astern. The best anchorage is with the east extreme of the sandy beach bearing E. by S. and the mouth of Rio Bueno bearing S.W.

Water.—A plentiful supply of good water can be obtained at a short distance up the river. The port of entry for Rio Bueno is Falmouth.

Coast.—From Rio Bueno the coast curves gradually round for $2\frac{1}{2}$ miles to another similar bight named Dry harbour. Off this coast, which is rocky, soundings to the 100-fathoms line extend for half a mile, whilst immediately inland, bluff cliffs rise perpendicularly 100 feet, shelve quickly for another 50 feet, and thence gradually slope to their highest point, 300 feet, midway between the heads of the two bights. The inland hills having slightly decreased in height again rise from Dry harbour and from the gorge of the Rio Bueno, quickly attaining 1,000 feet elevation, at about which height and two to three miles inland the range continues to the eastward parallel to the coast.

Dry harbour.*—The conspicuous cliffs eastward of Rio Bueno also serve to indicate the position of Dry harbour, it being situated 2 miles eastward of them in the bight above mentioned. Across the mouth of this harbour stretches a coral reef, for the most part nearly awash; but at two-thirds of the distance across from the west side of the harbour is a narrow channel carrying $2\frac{3}{4}$ fathoms on the leading mark, with coral heads and shoal water close to on either side of it. The only leading marks are, unfortunately, not at a sufficient distance from each other to be good. The channel is marked by two spar buoys, but little reliance can be placed upon them, and a stranger visiting the port for the first time should take a pilot. After crossing the bar, the water rapidly deepens to 25 and 30 fathoms, but there is a shoal spit $3\frac{1}{2}$ cables south of the bar and close eastward of the course to the best anchorage. This will be found on the edge of 10 fathoms in the south-east corner of the harbour; from 10 fathoms

* See plan of Dry harbour on Admiralty chart, No. 459; scale, $m = 4$ inches.

the depth rapidly shoals to 3 fathoms, thence gradually to 2 and one fathom.

Directions.—To enter, bring the east side of the western of two storehouses on Knox wharf bearing S.S.E. $\frac{1}{2}$ E. in line with the west side of the green verandah porch of the house close above and behind (Beverland house). This will lead between the two spar buoys if in place. Should one be adrift, great care must be exercised in determining which, for the channel lies only on the line of the leading mark, and there is a depth of $1\frac{3}{4}$ fathoms close-to on either hand.

Supplies.—Provisions are plentiful and the harbour abounds with fish, but water can only be obtained at $2\frac{3}{4}$ miles eastward of the harbour from Pear Tree bottom, which boats cannot approach during severe weather.

Coast.—From the entrance to Dry harbour the coast maintains an easterly direction for 5 miles to Runaway bay, so named as the point of escape in a small canoe of the last Spanish governor of Jamaica, Don Christopher Arnaldi Sasi, on the final capture of the island in 1659. The soundings extend off barely half a mile to the 100-fathoms line, and the land behind forms a gradual ascent to an elevation of 1,000 feet at 3 miles inland.

Runaway bay is a small open roadstead with a wharf; an unprotected anchorage may be obtained in 10 fathoms with the wharf bearing S.E. by S. distant 3 cables, and Flag point, the eastern extreme of the bay, bearing E. by N. $\frac{1}{2}$ N.

Coast.—From Flag point the shore takes an E. $\frac{3}{4}$ S. direction for $6\frac{1}{2}$ miles to the entrance of Saint Ann bay. Along this extent of coast many small streams and rivulets empty themselves into the sea. The western part is sandy, with a barrier reef extending about a third of a mile from the shore, the descent to a depth of more than 100 fathoms outside the reef being very rapid; the eastern portion of the coast is rocky and steep-to, the soundings hardly extending a quarter of a mile off shore. Behind this coast the land for about a mile rises very gradually and is for the most part occupied by sugar plantations; thence it rises abruptly to an elevation of 1,500 and 2,000 feet, the height of Cameron's Cap or the Camel's Hump. Saint Ann peak, conspicuous when seen from a position 10 miles to the north-eastward, is 2,130 feet high.

SAINT ANN BAY* may be recognised by the buildings of the town, situated on a gradually rising hill; by a large waterfall 3 miles to the eastward of the town and only visible when seen from the eastward; or by its position with regard to Saint Ann peak or the Camel's Hump.

* See Admiralty plan:—St. Ann bay, No. 451; scale, $m = 5$ inches.

The harbour is a basin formed in the coral reef 2 cables in diameter, with a narrow but deep entrance carrying 11 to 14 fathoms, which gradually decreases in depth to the southward. Vessels require to moor head and stern, and should select a berth towards the western side of the harbour to obtain during northers the full protection of the reef. On the western side of the anchorage, and detached from the main reef, is a heap of ballast, over which there is only one fathom water. To the south-westward of this anchorage there is a small arm suitable for small coasting vessels. During heavy weather a similar current and attributable to the same cause as at Falmouth is here experienced. This current running through the anchorage from the west, causes ships that are not well moored head and stern to lay broadside to the sea, and to roll most uncomfortably.

Directions.—To enter, bring the east road of the town, leading from the beach up the hill, open, when the east side of the custom house (which is the most easterly building on the water-line) will bear S. $\frac{1}{4}$ W., and be just clear of the west side of the Wesleyan chapel on the hill. When past the western reef, which is plainly visible, anchor as convenient. The above marks for entering are not easily made out in consequence of the trees grown about the Wesleyan chapel, and the east road being overgrown with grass. The best leading mark is Winder's house, the Baptist chapel, and a tin-roofed store in line, about S. 6° W., but none of these objects are fixed on the plan. Winder's house is easily recognised, standing by itself on a grassy slope at the back of the town, the West road (Market road), the main street produced up the hill would lead to it. The Baptist chapel stands a short distance inland from the tin-roofed store, it has two windows, and green painted door facing the channel, with "Baptist chapel" in black letters painted on it; the tin-roofed store stands close to the beach, touching east side of West or Market street, and immediately in front of it is a pier. (Captain and Navigating Officer, H.M.S. *Flamingo*, 1880, and other authorities.)*

Supplies.—Provisions are plentiful, and water may be obtained from Drax Hall river.

Land wind.—The continuous blowing of the sea breeze at times prevents sailing vessels leaving the port for some days, a wind off the land being necessary.

Coast.—From Saint Ann bay the coast curves gradually round to E.S.E. for $1\frac{1}{2}$ miles into Mammée bay, and thence E.S.E. again for $3\frac{1}{4}$

* April 1886, Navigating Officer, H.M.S. *Goshawk*, observes: The best leading mark to enter by is, House on hill with a black patch in the middle of it (Mr. Black's house, the black patch is a window, with a black verandah, when coasting steamers come in a white light is exhibited there) in line with crane on second eastern pier. There are two small spar buoys laid down outside the reefs to mark the channel, but they cannot be seen till close to them.

miles to Ocho Rios. Mammée bay has a fringing reef extending from the shore, and some prominent red cliffs at its eastern extreme, near which a river falls into the sea. The falls of this river at a short distance inland are plainly visible from seaward, and are of some extent. From Mammée bay to Ocho Rios the coast is rocky with occasional sandy beaches, and has many small waterfalls along it of from 10 to 30 feet in height.

Ocho Rios* is situated in the bottom of a bay, from the eastern entrance point of which a plainly visible reef extends to the westward, affording partial shelter; the inner part of the bay is to some extent narrowed by a reef that runs out from the south side of the anchorage. It is easy of approach, the best berth being in $3\frac{1}{2}$ fathoms, with the wharf (which extends from a zinc-roofed warehouse) bearing S.E. by E., and the western extremity of the reef awash bearing N. by E. $\frac{1}{2}$ E.

OCHO RIOS BAY.—To enter the bay, Bull rock point (on which there is a conspicuous wall close to the water) should be steered for, bearing S. by W. until Dollars pier bears S.E. by E., when the pier should be steered for on that bearing; anchor in 7 fathoms with the west extreme of the reef bearing N.N.E. Small vessels might anchor one cable nearer the church in $4\frac{1}{2}$ fathoms, with the west extreme of the reef bearing about N. by W.

The bay is protected from all winds, except those between North and W.N.W., and it is considered one of the healthiest places on this coast, possibly from the absence of low land.

Ocho Rios is in telegraphic communication with Kingston, mails are received and despatched three times a week, and the usual provisions can be obtained.

Supplies.—Provisions are plentiful, and water is obtainable from any of the springs that discharge themselves into the harbour.

Coast.—From Ocho Rios the coast (which is rocky alternating with sandy bays) trends E. by N. $\frac{1}{4}$ N. for $3\frac{1}{2}$ miles, past White river mouth to Frankfurt point, with soundings extending off to the 100-fathoms line for three-quarters of a mile. At Frankfurt point it alters in direction to E. by S., and rises in bluffs of 60 to 100 feet in height for 2 miles to Rio Novo, where there is a small unprotected anchorage close to the shore and steep-to.

Ora Cabeza, situated E. $\frac{1}{2}$ S., distant 3 miles from Rio Novo, is a better anchorage than Rio Novo, having a depth of 10 fathoms, mud, with the N.W. extreme of a small islet at its eastern part bearing E.N.E., distant 2 cables; it is, however, open and exposed to the north and west.

* See Admiralty plan:—Ocho Rios bay, No. 451; scale, $m = 3$ inches.

Coast.—The coast from Rio Novo consists of cliffs 30 to 40 feet high, off which soundings run for a short distance; at the eastern extremity it curves round slightly with a sandy beach in the bight, on which the small village of Ora Cabeza stands. From Saint Ann bay the land continues to rise immediately beyond the coast line, but decreases its comparative altitude, attaining 1,660 feet at $1\frac{1}{2}$ miles inland from Ocho Rios, whilst at the same distance south of Frankfurt point it is barely 800 feet high, and decreases in elevation again towards Ora Cabeza. From the bight in which the latter village is situated to that in the bottom of which lies port Maria, the coast line is low and rocky, with hills rising gradually behind to a height of from 400 to 500 feet. It is steep-to and may be approached by vessels beating to windward with perfect safety. From Ora Cabeza the shore curves N.E. $\frac{1}{2}$ E. for one mile, then runs easterly for 3 miles to Gallina point, from whence it trends to the southward for a distance of 2 miles to the town of port Maria.

PORT MARIA* is divided into two portions by Cabrita island. - The town is situated on the shores of the western part, in which is the best anchorage, the other portion being at present seldom used on account of the decrease in sugar cultivation. The shore between Gallina point and the town forms a shoal bay, and is covered with a forest of cocoa-nut trees, which serve to indicate its position from a distance.

Directions.—To enter, a vessel should carry easy sail and steer midway between Fort point and Cabrita island, with the westernmost wharf bearing S.S.W., and be prepared to anchor shortly after Pagee point (the eastern entrance point) is shut in by Cabrita island. Cabrita island is fringed for a distance of three-quarters to one cable from the shore with reefs and foul ground, which must be borne in mind when shooting up after rounding to.

Supplies.—Provisions are easily obtainable; good water may also be procured from Pagee river in the S.E. corner of the bay.

Quarantine.—The quarantine ground of port Maria is at Ora Cabeza.

Coast.—From Pagee point the land behind is bold, quickly rising to a height of 800 and 1,000 feet; the coast runs, with some small bays and coves, in a S.E. by E. $\frac{1}{2}$ E. direction for $4\frac{1}{2}$ miles to Blowing point, whence it trends S.S.E. for 4 miles, and then E.N.E. for $1\frac{1}{2}$ miles to Free point, the bight between Free and Blowing points being known as Annatto bay.

Sheerness bay is small, with a coral fringed harbour for droghers and lighters, open to the N.E., and lying one mile south of Blowing point.

* See plan of Port Maria, on Admiralty chart, No. 459; scale, $m = 4$ inches.

Jack's bay, with a shipping wharf, lies $1\frac{1}{4}$ miles south of Sheerness bay.

Wag Water river.—The mouth of this river lies half a mile north-west of Gray's Inn wharf in Annatto bay.

ANNATTO BAY.*—The town in this bay is situated close to the beach, and is easily recognisable by its stores and the church in the north-east corner within a mile of Free point. At the south-west end of the town is situated Gray's Inn wharf, with an estate at the back; close to Annatto bay church is situated Gibraltar wharf.

Schoolmaster shoal runs to the north-westward from Gibraltar wharf and turns to the eastward towards Free point, affording to some extent protection to the anchorage during the usual sea breeze, but none from northers.

Anchorage.—The best anchorage is as close to the north-eastward and to Schoolmaster shoal as possible, with Gibraltar wharf bearing E.S.E., distant $2\frac{3}{4}$ cables. This position is a good one from which to leave for sea on the approach of a norther; there is good holding ground along the east side of the bay, but its extent rapidly narrows to the south-westward.

Directions.—If entering from a position to windward, do not run down within one mile of the shore nor haul to the southward until Gray's Inn house is open westward of Gray's Inn wharf bearing S.W. $\frac{1}{4}$ S. A vessel is then clear of the extreme of Schoolmaster shoal and may run S.W. until abreast the proposed anchorage. The bank shoals very rapidly, and, as vessels should invariably moor, the port anchor must be dropped in about 15 fathoms with plenty of cable ready, and the other anchor let go in about 5 fathoms, whilst the kedge should be ready for running out astern to hold during land winds.

Coast.—From Free point the shore trends E. $\frac{3}{4}$ S. for $2\frac{1}{2}$ and $3\frac{3}{4}$ miles to Dover and Palmetto points respectively, past the lights forming Fort Stewart and Fig Tree bays, which are very foul to a distance of half a mile off shore. Between Palmetto and Savannah points, Buff bay is formed by the shore trending S.E. for $3\frac{1}{2}$ miles, and then E. by N. $\frac{1}{4}$ N. for $2\frac{3}{4}$ miles. The western part and bottom of this bay are very foul, and break in 5 and 6 fathoms at a quarter of a mile off shore, the bottom being composed of rocky pinnacles.

Roadstead.—Off Spring Garden wharf, situated $2\frac{1}{4}$ miles west of Savannah point, a vessel would find anchorage in 12 fathoms, mud, at

* See Admiralty plan:—Annatto bay, No. 451; scale, $m=5$ inches.

1½ cables N.N.E. of the wharf; this anchorage cannot, however, be recommended, being on a lee shore during northers, and unprotected from the sea raised by the ordinary sea breeze. The bank is very steep-to, and rapidly shoals from the anchorage, the quality of bottom changing from mud to stones and gravel. It is, in fact, only suitable for droghers, as is also a small spot off Orange bay close to Savannah point.

To the eastward of Wag Water river at Annatto bay the land rises very rapidly from the coast into well-defined hills that inland form the spurs of the Blue mountain range. The intervening ravines are deep, with small fertile plains at their coast termination; they contain rivulets and streams which, during heavy rains, deepen into rivers and torrents, preventing communication and sweeping away the shingle barriers on the beach that are thrown up by the surf.

Coast.—Between Savannah point and Ship rock (a distance of 6½ miles in an E. by S. direction) there are two bights forming Hope and Saint Margaret's bays, in the bottoms of both of which there are anchorages for droghers and boats only. Along this coast the 100-fathoms line lies from a half to three-quarters of a mile off the shore, which is very steep-to. The coast range rises in places to a height of about 800 feet; between these hills and the Blue mountain range is a fine valley, formerly cultivated with sugar, but now rapidly growing into bush again. The Rio Grande rises to the eastward of the Blue mountains, and, flowing N.W. through a deep valley, empties itself into St. Margaret's bay.

PORT ANTONIO.*—From Ship rock to port Antonio, which lies 2½ miles eastward of it, the coast runs E. ¾ S. for three-quarters of a mile to Ship head, and thence S.E. for a distance of 2 miles.

Two truncated pyramidal white beacons have been erected on the western side of West harbour; the west beacon is about 100 feet above the level of the sea, and the east beacon is situated close to the beach. These beacons in line bearing W. by S. ½ S. lead through the channel between Navy island and Titchfield peninsula. A light is shown from these beacons when the coasting steam vessel is expected.

West harbour.—The wreck of the steam vessel *Calvert*, sunk in 7 fathoms, forms an obstruction to the navigation of West harbour. From the funnel of the wreck the East beacon bears S. 72½° W., the north-east extreme of Titchfield peninsula N. 81° E., and the south-west extreme of Navy island N. 53° W., distant one cable. The wreck will probably be removed as soon as practicable.

Buoys.—A red can buoy, surmounted by a staff and cross, is moored in 3 fathoms on the outer edge of the reef extending from the south-east

* See Admiralty plan:—Port Antonio, No. 451; scale, $m = 5 \cdot 0$ inches.

extreme of Navy island, with Folly point bearing N. $62\frac{1}{2}^{\circ}$ E., and the east extreme of Titchfield peninsula bearing South.

A black can buoy, surmounted by a staff and cross, moored in 18 feet, marks the northern edge of the reef extending from Old Fort point; from the buoy, Folly point bears N. $56\frac{1}{2}^{\circ}$ E., and the east extreme of Titchfield peninsula bears S. $\frac{3}{4}$ E.

Light.—It is intended to erect a lighthouse on Folly point.

Western harbour.—The inner or western harbour, off which lies Navy island protecting it and making it a secure anchorage in all winds, has a depth of between 6 and 7 fathoms, mud. It is approached from the eastward through a narrow but deep channel, about half a cable wide, between Navy island and the main; there is also a narrow outlet to the northward, through a tortuous channel with 2 fathoms water in it, but useless for any but small cargo boats; this harbour can only be left with a land wind.

A local regulation prohibits vessels anchoring inside the line drawn from the west point of Titchfield peninsula to the Annatto river.

Eastern harbour.—The eastern harbour, divided from the western harbour by Titchfield peninsula, can be left with either a land or sea breeze. It has good holding ground in from 10 to 6 fathoms for large vessels, but, being open to northers which send in a heavy sea, it is not so much frequented as the inner harbour.

The entrance, between the east extreme of Navy island and Folly point, is 3 cables wide, but being foul for half a cable on either side, the working ground is narrowed to 2 cables.

Directions.—For eastern harbour, keep well in mid-channel at the entrance and then steer S. by W. $\frac{1}{2}$ W., anchoring as convenient towards the western side of the harbour to avoid Grunt rocks, which lie off the eastern side. If proceeding to the inner harbour, hug Folly point when entering until the channel is well open, when keep away W.S.W. through it, keeping a good look-out at the mast-head. There is a slight set from the Eastern harbour towards the reef off Navy island, on which is a depth of 7 and 8 feet; this must be borne in mind when proceeding either way through this channel in light winds.

Supplies.—Provisions are plentiful, and good water is obtainable from either a well or Annatto river, both situated in the western harbour.

Coast.—From Folly point (close to the eastward of which is situated Woods island, about three-quarters of a cable in extent and 15 feet high) the general direction of the coast is E. by S. for $4\frac{3}{4}$ miles to King point,

passing the droghing stations of Turtle Crawle, Cold harbour, and Blue hole. Soundings extend for a very short distance off shore, the bottom being coral and rock. Eastward of King point is situated Boston bay, open to the trade' and north winds, and with a foul bottom, except in its south-west corner, where is a patch of sandy bottom that affords an anchorage for small coasting vessels.

From North-East end (the north-east extreme of Jamaica) to Morant point the general direction of the coast is S.E. by S., the distance being 17 miles with Manchioneal harbour lying about midway and Plantain Garden bay lying N.W. $\frac{3}{4}$ W. 3 miles from Morant point.

Priestman river bay lies one mile southward of N.E. end, and Long bay $2\frac{1}{2}$ miles. They are both steep-to, soundings to the depth of 100 fathoms, over rock and sand, extending off shore for about half a mile ; being on a dead lee shore, neither of these bays is available as an anchorage ; the cliffs that fringe them rise perpendicularly from the water to 20, 30, and 40 feet in height.

Manchioneal harbour.*—This harbour, situated at the south extreme of a cocoa-nut plantation 2 miles long on the coast, is very small ; a reef extending from Nettle point on its north side narrows the entrance to a width of half a cable, which leads to an anchorage close off Shipton point, barely exceeding one cable in diameter. From this anchorage to the northward is a narrow well-protected haven for small craft ; it is half a cable wide at the entrance, with 5 fathoms, and gradually shoals inwards. Vessels should moor in the southern anchorage in about 7 fathoms, and as from its small size the placing of the anchors is of great importance, a pilot should be taken.

Supplies.—Provisions are plentiful, and water is obtainable a short distance up the Drift river, which, during heavy rains, swells and causes a strong off-set through the harbour and entrance.

Red cliffs.—Between Manchioneal harbour and Plantain Garden bay are some remarkable red cliffs at South Booby point, which will serve to indicate the position of either place.

Plantain Garden bay.—This bay cannot be recommended as an anchorage on account of its exposed position and the difficulty of getting away on the setting in of a norther or N.E. wind, caused by the rapidity with which the bottom shoals from deep water to the broken and foul ground fringing the coast.

* See plan of Manchioneal harbour on Admiralty chart, No. 459 ; scale, $m = 4$ inches.

Coast.—The general nature of the coast from port Antonio to South Booby point is clifty, with little sandy coves interspersed, off which rocky and foul ground generally extends. But from South Booby point the land commences to fall and trends into Plantain Garden bay, then sweeping round S.E. again towards Morant point.

From port Antonio a range of hills commences to rise gradually towards the direction of Morant point, attaining on the bearing of W.S.W. from Manchioneal harbour and at 4 miles inland a height of about 3,000 feet and running almost parallel to the coast, towards which by degrees they fall. From the summit they fall more rapidly to the southward and terminate at Plantain Garden river, thence to Morant point being an almost level plain.

Current.—Along the north coast of Jamaica the prevailing current is to the westward with the trade wind, varying from half a knot to $1\frac{1}{2}$ knots an hour with the strength of the wind; this prevailing current is occasionally replaced by a slight easterly set, most observable, but not always so, during the moon's second quarter.

The following information, resulting from a survey of Pedro bank and cays by Lieutenant A. Carpenter, H.M. surveying schooner *Sparrowhawk*, 1880, has been prepared from the report and observations made by that officer.

PEDRO BANK.*—This bank, within a depth of 100 fathoms, is about 100 miles long in an East and West direction, and 55 miles broad at the western part; the breadth in a North and South direction at 25 miles from the eastern limit is only 9 miles, and the eastern extremity terminates in a point in lat. $17^{\circ} 7' N.$, long. $77^{\circ} 19' W.$

The bank rises abruptly from depths of 250 and 350 fathoms, and the edge (which is very steep-to) is of white limestone, on which are found sponges, branching coral, and corallines.

The surface of the bank is tolerably level, having over it depths of from 9 to 15 fathoms, except near the southern edge, which is dangerous of approach, and where there are numerous rocks, cays, and shoals; the northern and western parts of the bank are clear of dangers.

The bottom is generally of white sand and dead coral, but occasionally it is composed of weed and live coral.

At the north-west part of the bank the bottom is of a somewhat reddish colour.

Over the eastern extreme of Pedro bank, even in moderate weather, the sea is generally rough with overfalls; over other portions of the bank the sea is not higher than in deep water.

* See Admiralty chart :—Part of Jamaica and Pedro bank, No. 450; scale, $m = 0.21$ inch, with plans.

As a general rule, shoals having less than $3\frac{1}{2}$ fathoms over them can be seen from aloft as discoloured water, unless the sun is in line with them or the sea high.

Portland rock.—This rock (lying S.S.W. from Portland point, south coast of Jamaica distant 40 miles, and 8 miles within the east extreme of Pedro bank) has a double summit, the southern peak of which is 32 feet high and the northern 30 feet high; it is 290 yards long in an N.N.E. and S.S.W. direction, and appears double when bearing either east or west.

A ridge, over which there are irregular soundings, extends half a mile N.N.E. from Portland rock.

Position.—From numerous observations made on and near Portland rock the position was determined as follows:—Lat. $17^{\circ} 6' 20''$ N., long. $77^{\circ} 27' 10''$ E.

Anchorage.—A vessel seeking temporary anchorage may slowly approach the western side of Portland rock and anchor in 8 fathoms, clear sand, within a distance of two cables from it; westward of this position the depths increase to 10 and 12 fathoms.

Landing on Portland rock is very difficult to effect.

Blower rock.—Blower rock, lying S.W. from Portland rock distant $5\frac{1}{4}$ miles, is about 20 yards long, and 2 to 3 feet high.

This rock is steep to on the eastern side, where a depth of 6 fathoms is found close to; a spit, having from 3 to 5 fathoms on it, extends nearly half a mile N.W. from the rock.

In ordinary weather the sea breaks heavily on Blower rock, and the column of water sent up can be seen from a considerable distance.

Caution.—Vessels should not cross the Pedro bank between Portland rock and Shannon shoal without having local knowledge, nor under any circumstances should they do so at night.

If crossing Pedro bank through the channel eastward of Blower rock, vessels should pass within 3 miles west of Portland rock.

If crossing westward of Blower rock, unless the breakers on that rock are clearly seen, it is advisable to sight Shannon shoal.

A small shoal, with a depth of 2 fathoms over it, lies S.S.W. $\frac{3}{4}$ W. from Blower rock, distant 6 cables.

Shannon shoal.—This dangerous shoal, which within a depth of 3 fathoms extends one mile in an E. by N. and W. by S. direction, lies on the southern edge of Pedro bank, at about 14 miles S.W. by W. $\frac{3}{4}$ W. from Portland rock. In calm weather it uncovers about $1\frac{1}{2}$ feet for a length of 50 yards near the western extremity, but during rough weather or even in a moderate sea, the shoal is covered with breakers.

Shannon shoal shelves evenly to a depth of 6 fathoms, but beyond that depth irregular soundings are found for a distance of 2 miles in a northerly and N.W. direction. If approaching from the southward, the soundings would not give sufficient warning of approaching this danger.

In 1875 the Royal mail steam vessel *Shannon* was wrecked near the eastern extremity of this shoal, and in October 1880 a portion of the machinery was still to be seen rising over 20 feet above the sea, and forming an excellent beacon, which on a clear day was visible from a distance of 7 miles.

Shoal.—An extensive shoal, over which there is a depth of $4\frac{3}{4}$ fathoms, coral and weed, lies N.N.W. from that part of Shannon shoal which uncovers, distant one mile.

Caution.—The edge of the bank between Shannon shoal and N.E. cay forms a remarkable curve inwards. No attempt should be made to cross this part of Pedro bank.

PEDRO CAYS.—These four cays, known respectively as N.E., Middle, S.W., and South cays, are situated near the southern edge of Pedro bank, at about half a mile within the depth of 100 fathoms. These small islets (of which S.W. cay is the largest) are dependencies of Jamaica, and are rented by merchants in Kingston for the purpose of collecting guano. Temporary huts have been erected on these cays, close to which the best landing places will be found.

Cocoa-nut trees have been planted on N.E. and S.W. cays, but they do not yet rise above the bushes.

N.E. cay.—This cay lies W. by S. $\frac{1}{2}$ S. from Portland rock, distant 18 miles; it is about a third of a mile long in a N.N.W. and S.S.E. direction, and 160 yards broad, being covered with bushes, the tops of which are 12 feet above the water.

The large cocoa-nut tree formerly standing on this cay has been blown down.

From the south-east extreme of N.E. cay, a reef which breaks extends to the south-westward for a distance of one-third of a mile.

Anchorage.—Vessels can anchor in 5 fathoms over sandy bottom, with the north-west extreme of N.E. cay bearing E.N.E.; but there is generally an uneasy swell at this anchorage.

Shoals.—A shoal with 6 feet water over it lies E. by N. $\frac{3}{4}$ N. from the south extreme of N.E. cay, distant 2 miles; and a shoal with $3\frac{1}{2}$ fathoms over it lies N.E. $\frac{1}{2}$ E. from the same point, distant two-thirds of a mile.

Two small shoals, each about a quarter of a cable in extent, lie N.W. of N.E. cay; the outer of these, with $2\frac{1}{2}$ fathoms over it, is always visible from aloft, and lies nearly $1\frac{1}{3}$ miles from the cay, the inner with $2\frac{1}{4}$ fathoms

over it, is 9 cables distant; a third shoal, of about the same extent, with $3\frac{1}{2}$ fathoms over it, lies N.N.W. $\frac{1}{2}$ W. from the cay, distant half a mile.

Clearing mark.—The east extreme of S.W. cay (seen from aloft) open the apparent length of that cay west of Middle cay, bearing S. by W. $\frac{1}{2}$ W., leads north-west of these dangers.

Vessels approaching from the northward and having cleared the shoals, may pass between N.E. cay and Middle cay into deep water.

Middle cay.—This cay, about 12 feet high, lies S.W. from N.E. cay distant $2\frac{1}{2}$ miles, and is covered with brushwood; from the south-east extreme a reef, which generally breaks, extends to the southward, and is continued as a rocky ridge in the direction of S.W. cay, forming a protection to the anchorage.

Anchorage.—Anchorage will be found in 5 fathoms, bad holding ground, with the west extreme of Middle cay bearing East, distant one-third of a mile.

Shoal.—A shoal of $2\frac{1}{2}$ fathoms water, with a depth of 5 fathoms close to, lies N.W. by N. from Middle cay, distant half a mile.

Great numbers of fish were observed in the vicinity of this danger.

S.W. cay.—This cay is about one-third of a mile long in a N.N.W. and S.S.E. direction, and is partially covered with bushes, which attain a height of 12 feet above the sea.

A reef awash fringes the eastern side of this cay, and foul ground extends from it for a distance of two-thirds of a mile towards Middle cay.

Position.—The south-east extreme of S.W. cay was determined to be in lat. $16^{\circ} 59' 25''$ N., long. $77^{\circ} 49' 10''$ W.

Anchorage.—Good anchorage may be obtained westward of S.W. cay in any required depth, but small vessels desirous of anchoring close in should carefully avoid the spit extending from the north side of this cay.

Water.—The centre of S.W. cay is slightly depressed, and water may be procured by sinking a cask, but it is brackish.

NOTE.—A vessel leaving the anchorage off S.W. cay, and intending to proceed to the southward, should pass east of South cay.

South cay.—This cay, lying S. by W. $\frac{3}{4}$ W. from the south extreme of S.W. cay, distant $2\frac{3}{4}$ miles, and situated about a mile within the southern edge of Pedro bank, is 220 yards long in an East and West direction, and 8 feet high, being composed of dead coral of white appearance.

There is clear ground both eastward and southward of South cay, but shoal water extends about a mile northward and westward from it.

There is no anchorage off South cay, and landing can seldom be effected on it.

The channel between South cay and S.W. cay is available for vessels provided that South cay is not approached within a distance of $1\frac{1}{4}$ miles.

Shoals.—A shoal bank, which within a depth of 5 fathoms is about 3 miles long in a N.E. by E. and S.W. by W. direction, lies about half a mile within the southern edge of Pedro bank, at 4 miles westward of South cay.

Upon this bank are situated two shoal heads, at a distance of $1\frac{1}{2}$ miles from each other, the eastern of these (at half a mile within the eastern edge of the bank), with 6 feet water upon it, breaks in moderate weather, but the western shoal head, with 12 feet over it (lying nearly one mile within the western edge of the bank), seldom breaks; between these shoal heads there is a general depth of 4 and $4\frac{1}{2}$ fathoms.

A dangerous reef, over the centre of which there is a depth of 6 feet, lies about 10 miles S.W. by W. $\frac{3}{4}$ W. from South cay, and 5 miles E.N.E. from Banner reef, north extreme.

This reef, within a depth of 5 fathoms, is $1\frac{1}{2}$ miles long in a N.N.E. and S.S.W. direction, and probably breaks in heavy weather, but not in a moderate sea.

In the centre of the channel, between this reef and Banner reef, there is a depth of 8 fathoms.

A depth of 100 fathoms is found at $1\frac{1}{4}$ miles south-east of this reef.

Banner reef.—This danger, lying S.W. by W. $\frac{3}{4}$ W. from South cay distant 15 miles, is just awash, and in a smooth sea might show no indication of its existence; during a fresh breeze the sea breaks over a space extending about $1\frac{1}{2}$ miles in a N.N.E. and S.S.W. direction.

Numerous shoal heads, with sandy bottom between them, lie within a distance of one mile northward and westward from Banner reef, and this part of Pedro bank should not be approached under any circumstances.

At half a mile southward of Banner reef there is a depth of 65 fathoms.

The barque *Banner* was wrecked on this reef in 1880, and portions are still visible above water, but she is fast breaking up.

S.W. rock.—This rock, lying S.W. by W. $\frac{1}{2}$ W. from Banner reef, south extreme distant $5\frac{1}{2}$ miles, is about 50 yards long and 3 feet high, with a depth of 10 fathoms close to on the southern side, and 5 fathoms on the northern side; it lies within $1\frac{1}{4}$ miles of the southern edge of Pedro bank.

A spit, having from 5 to 6 fathoms over it, extends N.N.W. from S.W. rock, for a distance of one third of a mile.

S.W. rock is very dangerous, as in fine weather the vicinity is only indicated by rippings.

N.W. ridge.—Two shoals, over which there are depths of 8 fathoms, 10 half a mile within the southern edge of Pedro bank, in long. $78^{\circ} 33' W.$ and $78^{\circ} 38' W.$ respectively.

Tides.—It is high water, full and change, on Pedro bank at about 8h. 45m.; springs rise about $1\frac{1}{2}$ feet.

Current.—The general set of current over the eastern part of Pedro bank is to N.W., attaining its greatest velocity when the trade wind is strongest, but seldom exceeding the rate of one knot an hour.

In calm weather the flood tidal stream sets to S.S.E., but is easily overcome by a slight breeze.

The ebb stream apparently sets to N.W. as soon as the moon has passed the meridian.

In moderate weather a slight southerly set may therefore be expected for 5 hours preceding the moon's upper or lower transit, and a strong set to N.W. for the next 7 hours.

Over the western part of the bank, the currents set to N.N.W. and to S.W., having a tendency to the northward on the north edge of the bank and to the southward on the south edge; the velocity, which varied from half a knot to $1\frac{1}{4}$ knots an hour, was affected by the wind.

No easterly set was observed during the survey in 1880 on this part of the bank.

BAXO NUEVO or NEW BORE,* about 95 miles S.W. by S. of Portland rock, is oval-shaped, about 14 miles in extent E.N.E. and W.S.W., and 5 miles in breadth. Two extensive reefs rise from the bank; the eastern one, close to its edge, is a solid semicircular reef, convex to the eastward, dry in places, with its horns curving along on the north and south sides of the bank for about $2\frac{1}{2}$ miles, and at the southern termination is a dry sand bore. It is steep-to, the edge of soundings being about a quarter of a mile off, except at the north-eastern end, where it is about one mile off.

The south-western, nearly a similarly formed reef, is separated from the eastern by an opening about one mile wide, and it trends along the south-eastern edge of the bank for $7\frac{1}{2}$ miles from the south-western extremity of the eastern reef, and near its termination is a sand bore. A shallow ledge, with 10 fathoms water close to it, runs off to the westward of the bore for about $1\frac{1}{2}$ miles to within 2 miles of the south-west end of the bank, which makes this termination of the reef, if possible, more dangerous than the other. Small ridges of sand occasionally form on other parts of the reef, but they disappear in strong breezes.

On the northern point of this leeward reef, which is nearly in the middle of the bank, there is a barren cay, composed of sand, broken coral, and

* See Admiralty plan:—Baxo Nuevo or New Bore, No. 391; scale, $m=1.0$ inch.

drift wood, thrown up by the sea to the height of 5 feet. It is $1\frac{1}{2}$ cables in length, about a quarter of a cable in breadth, and lies in lat. $15^{\circ} 53' 0''$ N., long. $78^{\circ} 39' 4''$ W. On it there is a small pond, which is resorted to by seals; and in the months of March and April the bank is visited by fishing vessels from St. Andrew and Old Providence for the purpose of taking them.

To the westward of the eastern reef the north side of the bank is clean for about a mile within its edge, as far as about 2 miles westward of the cay. There is also a clear space of about 3 miles on the western side of the bank. The depths vary from 8 to 17 fathoms water over coral and sand. Care should be taken when standing towards the broken ground on the north side of the leeward bank, as a coral head lies W. by S. $\frac{3}{4}$ S. 2 miles from the cay. The northern edge of the bank is also so steep that the first cast of the lead may be 12 or 15 fathoms. The bottom is visible. The current in the vicinity of this reef sets strong to the westward, at times as much as two miles an hour.

Anchorage may be taken up in moderate weather in 8 fathoms water, with the cay bearing E. by S., distant about $1\frac{1}{2}$ miles, but it is exposed to the winter breezes.

THE CAYMANS.*

These three islands lying to the north-westward of Jamaica, and in the track of vessels sailing from that island to cape St. Antonio, in the island of Cuba, are between the meridians of $79^{\circ} 44'$ and $81^{\circ} 26'$ W., and the parallels of $19^{\circ} 14'$ and $19^{\circ} 46'$ N. The westernmost island is named the Grand Cayman, from its being the largest; the second the Little Cayman; and the easternmost the Cayman Brac.

Grand Cayman.—This island is 17 miles in length east and west, 4 miles in breadth at the east end, and 7 miles at the west. It is low and irregular, and can only be seen from the deck of a moderate sized vessel about 12 miles. Its south-east end forms a rounded bluff cliff, topped with trees to the height of about 40 feet above the sea. The south-west end is low and sandy, and at two cables southward of it is a small sandy cay, about 2 or 3 feet out of water, from which a reef, which generally breaks on the greater part, runs off nearly half a mile; it therefore requires great caution when rounding this end of the island, especially at night, as the lead will give but short warning. The north-west extreme is similar to the south-east; the north-east end is somewhat lower.

* See Admiralty chart:—Grand and Lesser Caymans, No. 462; scale, $m = 1.0$ inch. with plans, scale, $m = 3$ inches.

The island is almost everywhere thickly wooded; and on all sides but the west is skirted by a reef, which is steep-to, to the distance of from a quarter of a mile to one mile. At the east end it forms a solid barrier to the distance of one mile, and the sea breaks on it heavily at all times. There are several small cuts through the reef on the south side, which admit the small vessels of the island into shelter within. The largest opening is on the north shore near the north-west end, and it leads into North sound, which is shallow and of considerable extent. There is a church, and a small village is scattered along the shore of the bay at the south-west end of the island, but the principal settlement is at Bodden town, which stands about midway on the southern shore. In 1875 the island contained about 3,000 persons.

Anchorage.—The only anchorage for large vessels at the Grand Cayman is under the west end, about $1\frac{1}{4}$ miles northward of the south-west point. Care, however, should be taken to pick out a clear sandy spot, which can be easily done by the eye, and shoot in under easy sail, for the soundings do not extend more than about 2 cables from the shore, and the edge is very steep. A clear berth will be found with the church E. $\frac{1}{4}$ S., and the south-west point S. $\frac{1}{4}$ W., in 7 or 8 fathoms; but if it is merely to communicate a vessel had better remain under sail.

As before stated, great care must be taken in rounding south-west point to give it a berth of at least a mile, until it is brought to the eastward of North. In leaving the anchorage with the usual trade wind, it will be better to heave the anchor up before making sail, to prevent dragging at a short stay, for the holding ground is not good, and the anchor in tripping might catch under a shelf of rock and be lost or broken.

Supplies.—This anchorage is a convenient place for obtaining wood and stock, except cattle, which are not always to be had at the moment; turtle is generally in abundance, and is the chief commerce of the island. Strangers approaching are met off the south side at a considerable distance by canoes having them for sale. Water is obtained from wells at about 100 yards from the beach, but it is scarce.

Cayman bank,* which lies about 10 miles westward of the Grand Cayman, is a remarkable ridge of coral and sand, taking a N.E. by E. $\frac{1}{2}$ E. and S.W. by W. $\frac{1}{2}$ W. direction, with a slight curve to the south-east. It is 5 miles long, but scarcely half a mile broad, with a depth of from 15 to 20 fathoms; on the edge the lead drops off suddenly into more than 100 fathoms water. From the north-east end, the north-west point of the island bears E. by N. $\frac{1}{2}$ N. $6\frac{1}{2}$ miles, and the south-west point E.S.E.

* See Admiralty chart :—West Indies, No. 392; scale, $d = 1.9$ inches. Also No. 761; scale, $d = 2.0$ inches.

8 miles; and from the south-west end the former bears E.N.E. $10\frac{1}{2}$ miles, and the latter E. $\frac{1}{2}$ S. $11\frac{1}{2}$ miles, and barely in sight from the deck of a moderate sized vessel. By keeping a good look-out the discoloured water may be seen, and sometimes it may be detected by a strong current ripple.

Pickle bank, discovered by H.M. schooner *Pickle* in 1840, is in lat. $20^{\circ} 23' 20''$ N., and long. $80^{\circ} 29' 52''$ W.; it is coral, of irregular shape, nearly $2\frac{3}{4}$ miles long in a N.E. by E. and S.W. by W. direction, and a little less than one mile wide. The depths on it are from 10 to 40 fathoms. The edge of the bank is clearly marked when over it, and the depth thence increases suddenly.

The following sailing directions for the Lesser Caymans, (comprising Little Cayman and Cayman Brac islands,) are derived from the survey made by Lieutenant A. Carpenter, H.M.S. *Sparrowhawk*, 1880.

LITTLE CAYMAN.*—This island is nine miles long in an E.N.E. and W.S.W. direction, and about one mile broad; it is covered with bush, and has two small hills on it about 50 feet high.

When seen from eastward, the most conspicuous part of the island is Weary hill, 45 feet high, situated a mile from the east extreme.

Sparrowhawk hill, 48 feet high, situated near the north shore, about midway between the east and west extremes of the island, appears as a double peak when seen from northward or south-westward; Cleft Tree clump on the south shore is also a conspicuous object. Sand Cliff point, near the east extreme of the island, appears as a white patch when seen from Cayman Brac.

South coast.—The south coast of the island is sandy, and for the most part skirted by a reef on which the sea constantly breaks; it is steeper than the northern side of the island, and the bottom is foul. The bank of soundings to the depth of 100 fathoms extends generally half a mile off shore on the south side of the island, and there are no off-lying shoals: off Sand Cliff point the bottom within a depth of seven fathoms is irregular.

South Hole sound.—There is a passage through the fringing reef, the entrance to which can be seen from aloft, leading to a reef harbour (South Hole sound) opposite the village, situated 2 miles from the south-west extreme of the island; this passage is available for large boats and schooners.

* See Admiralty charts :—Grand and Lesser Caymans, No. 462; also West Indian islands and Caribbean sea, No. 761.

Anchorage.—During the winter months, when the prevailing winds are from northward, anchorage may be obtained on the south side of the island in 7 fathoms, on a white patch off a rocky ledge situated one mile eastward of S.W. point, and where the coral reef joins the shore line. A vessel should approach this anchorage carefully, and anchor with the south extreme of South-West point bearing West, and a conspicuous cocoa-nut tree bearing North.

The coast at this part is not fringed with reefs.

Should the wind veer to the eastward it would be prudent to leave this anchorage for that at Anchorage bay on the north-west side of the island.

North coast.—The north coast of Little Cayman island is partly fringed by a reef, but there are several fair anchorages.

Anchorage bay, situated about half a mile north of South-West point, affords good holding ground in from 8 to 10 fathoms water, off a rocky coast which is steep-to.

A vessel should anchor where the bottom appears white, with S.W. point bearing S.S.W., and Jackson point in line with the eastern extreme of the bay.

Jackson point, situated 3 miles eastward of S.W. point, has on it the only large clump of cocoa-nut trees on this side of the island; a vessel may find shelter with Jackson point bearing E.N.E. in 8 fathoms, but within that depth the water shoals rapidly.

Reef harbour.—At the north-east extreme of the island there is a small harbour within the reefs, capable of accommodating schooners drawing from 8 to 9 feet, but it is much encumbered with rocks.

A quiet anchorage, during southerly and easterly breezes, may be found outside North reef, with East point bearing S.E. by E. $\frac{1}{2}$ E.

CAYMAN BRAC.—This island, situated 4 miles eastward of Little Cayman, is $10\frac{1}{2}$ miles long in an E.N.E. and W.S.W. direction, about $1\frac{1}{2}$ miles in breadth, and covered with thick bush.

It rises abruptly from the sea at N.E. point, to a height of 130 feet, decreasing gradually towards the western end, the cliff terminating one mile from S.W. point. The top of the island is flat, and intersected by a few rugged paths.

North-East point is steep-to, having 7 fathoms close to the shore. The sea breaks on the point, giving it the appearance of shoal water.

The south coast of the island is skirted by a broken reef.

The bank of soundings within 100 fathoms extends off shore about half a mile, except at N.E. and S.W. points, where the distance is increased to nearly one mile. There are no off-lying shoals, but within the depth of

5 fathoms there are occasional coral boulders rising about 6 feet from the bottom. This is especially the case in Stakes bay.

Anchorage.—The best anchorage is in Scott bay, in 9 fathoms, about half a mile N.E. of S.W. point; with Scott's settlement bearing S. by E.; and the high land at Stakes point nearly shut in with Frenchman point. Stakes and Bight bays, also on the north side, are quiet and safe anchorages outside the depth of 5 fathoms. Should the wind shift to the northward, anchorage may be found on south side near S.W. point, care being taken to find a clear spot for the anchor as the bottom is foul.

Caution.—Vessels anchoring on the north side are recommended to ride with a short scope of cable, as the weatherly* set of the current is liable (if riding with a long scope) to cause the chain to foul the coral heads, which, in the event of a squall, would bring up the vessels very short.

Care must be taken to avoid the turtle nets when about to anchor.

Population.—The population of the Lesser Caymans is about 300, principally Scotch. The men work in companies, fishing and turning turtle at Little Cayman, but residing at Cayman Brac, where their plantations are. The produce is dried and sent to Jamaica by schooners.

Supplies.—Boats will come off to vessels hove to off the north shores of the islands, and will probably bring off turtle, yams, and fruit. Water, which is generally brackish, may with difficulty be obtained from the wells attached to the houses on the islands, by application to the owners.

Winds and weather.—Summer winds range from E.N.E. to S.S.E. Rainy weather sets in about the middle of May and continues till August. Heavy squalls are prevalent from East and E.N.E. in June, coming on suddenly at or before midnight. From November to April the direction of the wind is from N.E. to North, seldom varying for more than 48 hours. There is at that time very little smooth water, and landing is difficult. When the land winds are strong on the coast of Cuba, the swell rolls across and breaks heavily on the northern shores of these islands.

Tides.—It is high water, full and change, at Lesser Caymans at 8h. 50m. ; springs rise 18 inches.

* This weatherly set of the current is said to be constant near the shore of the Cayman (Navigating Officer, H.M.S. *Phoenix*, 1881).

CHAPTER VIII.

GREATER ANTILLES.—SOUTH COAST OF CUBA.

 VARIATION IN 1887.

Cape Maysi	-	-	1° 35' E.		Cape Pepe, isle of Pines	3° 55' E.
Cape Cruz	-	-	2° 55' E.		Cape San Antonio	- 4° 30' E.

This chapter contains a description of the south coast of Cuba, from cape Maysi, the east extreme of the island, to cape San Antonio, the west, with the adjacent islets, cays, and banks.

CUBA.

This, the largest island of the Antilles, was discovered by Columbus in 1492. It was first settled by the Spaniards in 1511, and since that time, with the exception of a very short interval, in 1762, it has remained in their possession. The extreme length of this island from E.S.E. to W.N.W. is about 620 miles, but it varies considerably in breadth, for between Tarquino on the south side, and Manati on the north, on the meridian of 76° 50', it is 90 miles broad, but between Batabanó and Havana it is only 27 miles. Its eastern portion is generally lofty and mountainous, and its shores from cape Maysi to Maternillos point on the north, and to cape Cruz on the south, are free of extensive dangers. The centre portion is low. The western part varies in feature, and the coast is here foul and dangerous.

In 1867 the population amounted to about 1,414,500, the majority of whom were slaves. Fevers of different degrees of malignity prevail from May to November, and occasionally throughout the year; amongst these the yellow fever is the most dangerous, all the sea ports are subject to it, but it is generally driven away by the "Nortes" or north winds, which blow at short intervals and with great force from November to April. Its products, which consist principally of sugar and tobacco, are of greater value than almost the whole of those of the other Antilles, but the disturbed state of the island has interfered greatly with its prosperity.

CAPE MAYSI,* the most eastern part of Cuba, although called a cape on account of its being the extreme end of the island, is nothing more than a bend of the coast, which curves very little westward of the meridian for a distance of 6 miles, but from the southward it appears as a long low point; about 2 miles northward of this extreme east point is a lighthouse. All this part of the coast is low, covered with brushwood, with a white sandy beach, and should not be approached too close, as it is foul, and about $2\frac{1}{4}$ miles southward of the lighthouse the Pintado bank extends a mile eastward. Between one and two miles westward of the point, the land commences to rise, and when seen from the northward forms three steps, the upper one of which gradually ascends to the summit of this end of the Cobre (Copper) mountains. This is a good guide to strangers coming from that quarter, bound to the southward, who are apt to mistake the termination of the slopes for the point of the cape, and by keeping away too soon, get to leeward.

Approaching this end of the island from the north-east several conspicuous peaks of the Cobre mountains present themselves. The most remarkable is the Yunque de Baracoa or the Anvil, about 27 miles westward of Maysi lighthouse, and 5 from Baracoa, for which bay it is a good guide. Great care should be taken in rounding cape Maysi in the night, for there are no soundings to serve as a guide, and the current is often strong to the westward, especially in the winter months.

LIGHT.—A *fixed* white light, 128 feet above the sea, is exhibited from the lighthouse north of cape Maysi, and in clear weather should be seen 17 miles. The tower is round, having an octagonal base, with the keeper's dwelling adjoining, and stands about 55 yards from the sea.

Pintado Point.—About half a mile southward of cape Maysi is Pintado point; thence the coast, composed of soboruco,† covered more or less with trees and brushwood, runs southward and south-west for $6\frac{1}{2}$ miles to Negra point, forming first a projecting cliff and then a bay. The shore immediately southward of Pintado point is called the coast of Pintado. Rather more than three-quarters of a mile from the point is the Cueva de Pintado, a large cave within which the sea breaks. About one mile southward of the cave is Quemado point, a little salient; nearly a mile from the latter is Bufeó point; and about 5 miles farther on is Negra point, $1\frac{1}{2}$ cables north of which there is a spring of fresh water.

* See Admiralty chart :—Cuba, Eastern portion, No. 2,580 ; scale, $m = 0\cdot 12$ of an inch.

† Soboruco, or low white rocky cliffs, composed of bleached honeycombed coral and indurated sand.

The high rocky mountain commences near Pintado point, rises by degrees, runs parallel to and near the coast, forming the two cuts or breaks of Ovando and Diamante.

Pintado Bank.—Between Pintado and Quemado points a bank extends seaward, and from its extremity Pintado point bears $W. \frac{1}{4} N.$, distant one mile. Near the bank there are from 4 to 8 fathoms water on fine white sand; at a cable from it 18 to 28 fathoms on rock; and from 3 to 5 cables from it the depth is more than 90 fathoms. Between Quemado and Negra points, 2 cables from the shore, there are 15 to 18 fathoms water, sand, gravel, or rock; and at half a mile off the depth is more than 90 fathoms. All the above coast is exposed to the eastward, the sea breaks on it, and it should not be approached.

Negra Point is a dark, barren, steep, projecting point, and easily distinguished; 6 cables off it there are 28 fathoms water, and at the distance of a mile the depth is more than 90 fathoms. From Negra point the coast of soboruco, covered more or less with trees, forming a curve outwards, trends to the south and westward for 7 miles to Caleta point; it is backed by the high land, which is close to it. About 60 yards S.W. of Negra point there is a little bay and a cave, formed by vertical cliffs, where the sea breaks heavily, and is called the cliff of point Negra. About $2\frac{1}{2}$ miles south-west of Negra point is Guanos point, known by a wood of palm trees on it. Between the two points there are 28 fathoms water, rock and gravel, 5 to 6 cables from the shore; and between the latter and Caleta point there are 18 fathoms, over gravel and rock, at 3 to 6 cables. Between Negra and Caleta points the depth exceeds 90 fathoms $1\frac{1}{4}$ miles from the land.

Caleta Point.—From Caleta point the coast of soboruco continues for nearly a mile as far as the beach of Caleta, which is about 90 yards in extent. A river finds its way to the middle of this beach, but except in the rainy season its mouth is generally choked and the water salt; but a little above, near some rocks, it is fresh. From the beach of Caleta, the coast is of soboruco for about 4 cables farther on to the beach of Blanca, so named from the colour of its sand, which is $1\frac{1}{2}$ cables in extent, and in its middle is a small ridge or front of rock, to the east of which and near the shore there is an excellent spring of water.

Two cables from the beach of Blanca is that of Caletilla, about 55 yards in extent, and half a mile farther on the beach at the mouth of the Jauco, which forms a point of sand. The water of the Jauco is drinkable, and boats can enter the river in the rainy season. The Jauco runs through a break in the mountains, and near its mouth is a small front of rock called Jauco cave point from a cavern which is in it. Thence follows the small

beach of Caletón, then a cliff of soboruco about a cable in extent, and in continuation the beach of the anchoring place of Vaquero, which is some 6 cables in extent, and a point of sand projects from its middle. Westward of the latter beach are some cliffs, and then a straight beach of about 6 cables in extent called Larga, which terminates in a rocky point; then follows the bay of Largo, 2 cables in extent with a sandy bottom; and 2 cables further on is Muertos beach, somewhat convex and more than half a mile in extent.

All along this part of the coast the mountains are near the sea, presenting the three breaks or cuts of Caleta, Caletilla, and Jauco, which are seen at a great distance. It is covered with wood, which is very thick near the mouth of the Jauco. From a little eastward of the beach of Caleta to as far west as Muertos, it is more or less bordered by a reef for from about one to $1\frac{1}{2}$ cables. A little outside it, or about 2 cables from the shore, the depths are 9 to 10 fathoms; but off the mouth of the Jauco this depth is found a third of a mile off. Between Caleta point and the beach of Caleta there is no bottom with 90 fathoms 6 cables from the land, nor off the mouth of the Jauco at three-quarters of a mile; elsewhere the depth is 90 fathoms half a mile from the shore.

Anchorage.—The anchorage of Caleta is on a bank of fine white sand, and in places rock and gravel, in the bay formed between Caleta point and the west end of the Blanca beach. It is sheltered from E.S.E. round by north to West. In general this anchorage is useful, as it is the only one on this exposed coast for some distance, and if in a good position the holding ground is fair. In order to anchor on this bank, steer in for the shore until at a quarter of a mile from it, and anchor in 10 fathoms water, sand. The bank is steep-to, and a quarter of a mile outside the depth of 17 fathoms, there is no bottom at 90 fathoms.

The anchorage will be known by two small isolated hills, called the Tetas, on the slope of the high mountain towards Caleta point. With S.E. or South winds it should not be taken. A head of rock with about $2\frac{1}{2}$ fathoms water on it, and 5 fathoms around, lies in the line between the beach of Caleta and the point of the same name, at a distance of nearly two cables from the former. Vessels are exposed to squalls from the valleys during strong north-east winds, which cause the anchors to drag.

Water and Wood may be had at the beach of Blanca, the former should be obtained at low tide.

River Seco.—The coast from Muertos beach runs about W. by S., $8\frac{1}{4}$ miles to Puerta point. The first quarter of a mile is of soboruco, and called the Costita, and then follows for about 6 cables the beach of

the river Seco. About a cable from the west end of this beach is the mouth of the river, which is only open during the rainy season. It has two bars, the first of rock and the other of sand farther in. The water, although drinkable, is thick and difficult to obtain at the bar for the rocks outside it. The best place to water is to leeward of the mouth. The river runs through a valley in the mountain near some small table land in the form of a trapesium, called the Yunque de Seco. About half a mile westward of the mouth of the river, at the termination of some cliffs about $1\frac{1}{2}$ cables in length, is the commencement of Llana beach.

Llana Point.—The beach of Llana extends over a space of $2\frac{1}{2}$ miles. In the middle of this shore there is a bed of a river called Cana, which is generally dry except in the rainy season; and 3 cables from the west extreme of the beach there was another glen, named Llana, which is also generally dry. Llana point, composed of soboruco, projects a little at the western termination of the beach. The coast for $1\frac{3}{4}$ miles westward of the point is of cliffs, with one or two bays. In the first third of this space is the Leap of Jójó point, which is high, salient, white, and seen at a great distance; the other two-thirds is high and steep. Jójó point, $2\frac{1}{4}$ miles from Llana point, is of black rugged rock, of moderate height, and at its inner part is an isolated elevation like a sugar loaf.

Jójó Bay is formed between the point of the same name and that of Tintorera nearly three-quarters of a mile west of it, where there is an anchorage for small vessels. The shore for $1\frac{1}{2}$ cables from Jójó point is of rock, then a beach continues for 3 cables westward of Tintorera point. This latter point is of sand, projects a little, and in continuation of it are the three pools, named Tintorera, Ciega mouth, Medio mouth, and the river Jójó. The river and pools, which appear to be supplied from it, have very good water, but it is more convenient to enter the river in the boats, as the mouths of the pools are only open when the river is swollen.

About a mile westward of Jójó bay is the mouth of the river Tacre, which will be known by a break in the mountain, and the beach half a mile farther on terminates at Puerta point. The coast is thickly wooded, except the Leap of Jójó, which is arid and deserted, and backed near the shore by high mountains. It is bordered at the distance of about a cable, but occasionally drawing nearer the shore, by a rocky reef, which is broken here and there. The soundings vary from $6\frac{1}{2}$ to 12 fathoms, sand or rock, 2 cables from the land, except off Puerta beach, where the depth increases so rapidly that there are more than 90 fathoms at the above distance from the point. All along three-quarters of a mile from the shore the depth is not less than 90 fathoms.

Anchorage.—There is anchorage for small vessels on the bank in Jójó bay, sheltered from E. by N. round by north to W. by S. In pro-

ceeding for this bay keep for the middle of it, but rather nearer Jojó point than that of Tintorera, to avoid a rocky shoal. When within the line of the two points, anchor in 8 or 9 fathoms water, fine sand, about $1\frac{1}{2}$ cables from the shore. There is anchorage farther out in 13 or 14 fathoms, sand, but more exposed to the swell. A rock above water, named Sombrero, lies about 60 yards off the eastern shore. This anchorage should not be taken with south or south-east winds. As there are houses in the neighbourhood, small supplies, wood, and water may be obtained.

The Coast for a cable westward of Puerta point is of soboruco, thence it curves somewhat outwards for a distance of $3\frac{1}{3}$ miles. The shore for about three-quarters of a mile west of the point is called Guayacanes, and near its west end and a little inland is the valley of the same name, with a break in the mountain. At the distance of a mile farther on is Guayacanes point, which is dark, of moderate height, and projects, with two small bays between. To the westward of the point is a beach, named Managuaco, about $1\frac{1}{4}$ miles in extent, with some scattered rocks near its western extremity; then follow some cliffs of soboruco, and the small bay of Caoba, which is of sand and scattered rocks, and lastly for about a third of a mile a rocky shore, when commences the beach of Imia.

River Imia.—The beach of Imia is nearly 6 cables in extent, and at its east end the river of the same name disembogues, where water may be obtained near its mouth, by approaching the shore W.N.W. of the small bay of Caoba, the only part of it free of reefs. In the space between Puerta point and the beach of Imia the high mountains range very near the coast, especially at Guayacanes point. It is covered with vegetation, which is very thick near the shore. There are from 6 to 12 fathoms water, sand, gravel, or rock, all along, 2 cables from the land; but at 6 cables no bottom with 90 fathoms. A reef skirts the shore at the distance of three-quarters of a cable.

Anchorage.—There is anchorage with northerly winds 2 cables off the east end of Imia beach in 8 or 9 fathoms water, sand and weeds. Water and wood may be obtained here, and provisions and cattle in the neighbourhood.

Coast.—From Imia beach the rocky coast of moderate deight continues westward with an outward curve for 4 miles to Yacabo point, in the middle of it is Imia point, steep and of moderate elevation. Yacabo point is a little salient, and from it the coast runs almost in a straight line to Piedras Gordas point, with several large rocks on it. From this point the shore forms a bay, at the head of which there is a beach 3 cables in length; the shore is clear of danger, with only one rock at its east extreme,

near which there is a stream that should be preferred for water to the river in the western part, as the boats are better sheltered.

In continuation of the bay the coast forms a point, called Guardaraya, and then runs straight and rocky, as far as Yacabo, a small bay of about three-quarters of a cable in extent, with gravel and scattered rocks, which is skirted by a flat reef and almost unapproachable. The high mountain, from the western extremity of Imia beach, still approaches the shore, ranges very near the point of the same name, and forms a break in front of the mouth of the river Yacabo. The vegetation is very thick at the mouth of this river. Along this part of the coast, at the distance of 2 cables, the depths are from 9 to 16 fathoms, sand and rock; and at 5 cables no bottom with 90 fathoms, except between Imia point and Piedras Gordas, where there are 90 fathoms 8 cables from the land. In front of the mouth of the Yacabo are some rocks and loose stones with deep water around them.

Anchorage.—There is anchorage in Yacabo bay, sheltered from northerly winds, in $5\frac{1}{2}$ to 8 fathoms water, sand, 2 cables from the eastern part of the beach. Care should be taken to anchor at the weather side of the beach to avoid the projecting heads of rocks that lie off the western part. Wood and water may be had, and provisions from the neighbouring houses.

Sabana-la-Mar Point.—From Yacabo bay the coast is rocky for about half a mile, and then follows a beach about 2 cables in extent, with a supply of good water at the eastern part, and the mouth of the river Ocampo at its western extremity, where there is also good water. From this beach the coast continues rocky for $3\frac{1}{3}$ cables to Ocampo point, and then for nearly half a mile farther to Uvero de Pancho, a small rocky bay 110 yards in breadth. Hence the coast, composed of soboruco, runs for 4 miles to Sabana-la-mar beach. At $\frac{1}{10}$ miles before reaching this beach there is a steep point of moderate elevation, with a rock on its summit, called also Sabana-la-mar, and cannot be mistaken; between the point and beach there are two other points, rather remarkable, forming a small bay.

The Beach of Sabana is a third of a mile in length; at its east end is a lake, and at its west end a river of good water runs into the sea, with its mouth free of obstructions, where water can be had without difficulty. The beach of Ciguatos, a third of a mile in extent, follows that of Sabana, and is separated from it by a small rocky cliff of about 120 yards in length. At the west end of Ciguatos beach the river of the same name disembogues in the rainy season, and in order to approach, it is necessary to close the middle of the beach and pass within the rocky heads until

arriving at its mouth. Thence a rocky coast runs westward for 4 cables, to a point somewhat salient, called Java, then for more than $1\frac{1}{2}$ miles farther the coast is high and steep, and 4 cables from its west end is the bay of Java, the entrance of which is not more than 110 yards wide, with a shelly rocky beach fronting it. At the back, on the hill, about 110 yards from the sea, there is a spring of good water.

From Java bay the rocky coast runs a mile farther to the entrance of port Baitiquieri, and a third of a mile to the south-west of it is the point of the same name. This part of the shore is called the coast of the Boqueron, from a break in the mountain, by which Santiago de Cuba may be known. The coast eastward and southward of the entrance Baitiquieri forms an angle of 130° . The high mountains range all along to very near the coast, forming several breaks or openings. Between the Uvero de Pancho and the eastern extremity of the shore of Ocampo, there are 13 fathoms water, sand and rock, at $3\frac{1}{2}$ cables from the coast, but about half a mile off there is no bottom with 90 fathoms. Along the beach of Sabana-la-mar and that of Ciguatos, there are 10 to 15 fathoms, sand, gravel, mud, or rock, a third of a mile off, but no bottom with 90 fathoms at the distance of three-quarters of a mile.

The coast westward of Yacabo bay is steep-to, and 4 cables from the land the depth is more than 90 fathoms, and one cable off, $7\frac{1}{2}$ fathoms, sand. From Ocampo point to Sabana-la-mar the soundings are from 9 to 11 fathoms, sand, gravel, or rock, 2 cables from the shore, and 6 cables off, there is no bottom at 90 fathoms. From Sabana-la-mar westward there is no bottom with 90 fathoms 4 cables from the shore, and at half this distance there are 15, 24, or more fathoms, over sand and rock. The coast is skirted here and there by reefs at the distance of a quarter or half a cable.

Anchorage.—Between Java point and the point $1\frac{1}{2}$ miles eastward of it, the coast forms a bight $3\frac{1}{2}$ cables deep, which is called Sabana-la-mar, and along its shore is the beach of the same name, and that of Ciguatos. A vessel will find anchorage at about a quarter of a mile off the eastern part of the former beach in 8 or 9 fathoms water, sand, 2 cables from a rocky point which projects from the eastern end of the beach, and opposite a cave where the sea breaks; but it should not be used with South or S.E. winds. This is the best place for casting, and farther westward the bottom is gravel and rock.

This anchorage is easily known from a distance. The Sugar-loaf should be detached or isolated, and of the shape which its name indicates, and eastward of another isolated mountain in the form of a coffin, at the foot of which is Sabana-la-mar point, known by the rock on its summit.

Water is abundant, and wood and provisions may be obtained from the neighbouring houses.

The Sugar-loaf rises N.N.E., distant rather more than three-quarters of a mile from the extreme east end of Sabana-la-mar beach, 860 feet above the sea, and can be seen 33 miles. From the westward it appears a sugar-loaf, and from the eastward in the form of the roof of a house, and is very remarkable.

PORT BAITIQUIERI.*—Sabana-la-mar point is 27 miles westward of Caleta point, and 4 miles farther is the entrance to port Baitiquieri. Its position is known by the separation of the mountains, which are distinctly seen on either side. The entrance between the outer points is nearly 2 cables in breadth, but it narrows to about 90 yards at the inner point, when the harbour opens out to between 2 and 3 cables in breadth, and about 6 in length. It is sheltered by the mountains which surround it with from 11 to 18 feet water, mud, but this latter depth is found only in the eastern part.

The entrance on either side is skirted by reefs; that on the east commences at the outer point, and sweeps round at a cable from the shore to the inner point; that on the west does not project so far off, but extends farther in. These reefs are awash, and the sea breaks heavily on them. The distance which separates them is 40 yards, but the narrow channel with 21 feet water, on sand, gravel, small shells, or rocks, through the entrance is only about 25 yards wide, and there are two points where it narrows to 14 yards. It will thus be seen how difficult and dangerous it would be to enter this port in a vessel of any size, on which account only schooners and coasting vessels frequent it. The shores of the interior of the port are low and thickly covered with mangroves, leaving here and there sandy places.

Vessels bound to Baitiquieri should close the weather coast to the distance of half a cable, and when the entrance of the harbour is open, haul up by the eye about N.N.W. between the reefs, which are plainly seen, and the colour of the water will indicate the channel. It is necessary to leave early in the morning with the land wind, which never fails.

Supplies.—At the head of the port is the mouth of the river Baitiquieri, but it is obstructed by mangrove trees. The water is good, and may be obtained by landing at Maestro Nicolás, which is near the foot of a hill, and rolling the cask to the river inland. Wood is to be had with facility, and cattle, pigs, and provisions from the adjacent houses. There is also an abundance of game and fish.

* See Admiralty plan :—Port Baitiquieri on No. 435; scale, $m = 4.9$ inches.

* The opening between the mountains, indicating the entrance to this port, is not distinctly seen until within a mile of the entrance; from the offing the mountains appear continuous, and when approaching from the southward a vessel should bring the Sugar loaf (Azucar Pan) to bear North, and steer for it on that bearing; on the eastern side of the entrance the hills are of conical shape, and on the western side the land rises in terraces.

Between the outer entrance points the channel is half a cable wide, but in the narrowest part it is only 50 feet in breadth, with a depth of 2 fathoms increasing to $3\frac{1}{2}$ fathoms; the reefs on both sides of the channel are seen when a quarter of a mile from the entrance.

There is a depth of from 9 to 15 feet water within the entrance, over muddy bottom of a slate colour.

Supplies.—The only supplies to be obtained at port Baitiquieri are wood and fresh water.*

Winds.—Between Pintado point and Baitiquieri the coast is sufficiently protected from north and north-east winds, which prevail during the winter months, except between Pintado and Caleta points, where the north-east winds, which blow hard, cause much sea. The land winds prevail all the year round at night, and blow fresh during the north and north-east winds, which much facilitates a vessel making easting, if the coast be kept close aboard so as to take advantage of them, as they do not reach far to seaward. From Baitiquieri to Guanós point the coast can be approached to the distance of a mile, but from the latter point round cape Maysi the coast should not be approached at night within 6 miles.

Current.—At a short distance from the coast the stream of the flood sets to the westward, and that of the ebb to the eastward. The general current runs constantly to the westward during the months of July, August, and September, and its rate varies with the force of the wind.

Mal-año Point.—From Baitiquieri the rocky coast runs S.S.W. for 3 miles to Tortuguilla point; thence nearly West for 2 miles to the river Yatera, which empties itself into a sandy bay; from here it again trends S.W. for 3 miles to Mal-año point, which is easily recognised from the east or west. About 4 miles westward of the point is port Escondido, to the eastward of which and near the entrance are two isolated hills. All this part of the coast is free from danger, and can be approached to a mile.

Port Escondido, or Hidden harbour,† as its name implies, is very difficult to discover until close to it; but the two small hummocks a little

Note * from the U.S. Hydrographic Notice, No. 17, 1879.

† See Admiralty plan :—Port Escondido; on No. 435; scale, $m = 4.9$ inches.

eastward of the entrance are a good guide from the southward. The entrance lies between two rocky points, about a cable apart, and is $1\frac{1}{2}$ cables in a N.W. and S.E. direction; but both sides are fringed with a coral ledge; that on the windward side extends off about a third of a cable, leaving a narrow channel about 80 yards in breadth in the centre, in which there are from 4 to 6 fathoms water. The interior opens out into an irregular form, the projecting mangrove points forming inlets of deep water close home to the swampy shores. Many small shoals lie in the way, but they are easily seen.

The port is sheltered from all winds, and fit for large vessels, but we cannot venture to give sailing directions. The safest way will be to place a boat on the edge of the weather reef, and the eye, with the assistance of the plan, will guide in without much difficulty or risk, even with the wind as far north as N.E. There is no fresh water to be found, nor is there any settlement near the shore, and consequently no pilots.

PORT GUANTÁNAMO, or Cumberland harbour,* $12\frac{1}{2}$ miles westward of Escondido, is capable of admitting vessels of large draught without difficulty, and in safety. The shore between it and Escondido forms small sandy coves, steep-to. This port, which is altogether about 11 miles in length, north and south, may be said to form two harbours; the inner, called the bay of Joa, has, however, a depth of only from 12 to 15 feet, and the channel leading into it, although deep, is extremely narrow. In the centre of the port the shores are deeply indented, forming small secure creeks, very convenient for vessels of light draught.

The entrance is nearly $1\frac{1}{2}$ miles wide, and may be readily made out, and its eastern side is a straight rocky shore $1\frac{1}{2}$ miles in length north and south. Just within the north end, there is a low spit of dry sand, called Fisherman point, on which there are palm trees and generally one or two huts. The only danger on this side is a rocky ledge, 3 cables in length, running off to the westward from Fisherman point, on the shoalest part there is 17 feet. About half a mile within the outer point is the beginning of a bank, which carries $3\frac{1}{2}$ to 4 fathoms over it; this bank extends westward more than half a mile, and the most projecting part of it lies with the mouth of the river Guantánamo, bearing about W. by S.

On the west side of the entrance to this part there is a look-out house erected on piles.†

About half a mile to the northward of the leeward point of entrance is the mouth of the Guantánamo or Augusta river, in which the depths are from 9 to 15 feet for a considerable distance within. Thence a low

* See Admiralty plan:—Port Guantánamo, No. 442; scale, $m = 1.1$ inches.

† The South Coast of Cuba is studded with small white look-out houses generally built on piles.—Navigating Officer, *Rover*, 1877.

sandy shore bends round to the north-east, forming the north side of the outer port, and near the centre of it there is a remarkable whitish brown cliff. A shallow bank or reef borders all this western and northern shore for about 2 cables.

Water may be obtained from the Guantánamo river, but the boats will have to proceed up as high as the Barcadero, about 11 or 12 miles from the mouth. It is also to be had from a small stream on the north-west shore of the inner harbour, the mouth of which is three or four hundred yards eastward of a remarkable red and white cliff. Near it are some stakes, and over it a remarkable lofty tree. The stream, although not more than 16 or 18 feet wide, is deep enough for launches; but be careful to get out before low water, as then there are only 2 feet on the bar. A place for watering will be found a little way upon the starboard hand, where there is a cleared space on the shore, or on the port hand where there is a fall.

Directions.—In standing for port Guantánamo from the southward, on about the meridian of $75^{\circ} 10'$ W., a remarkable conical peaked mountain will be seen to the N.N.W., about 15 miles westward of the harbour. As the vessel approaches the land, this mountain will assume a saddle-shape, and a small isolated hill, with two small paps or hummocks near it, will soon be seen to the westward. The east side of the entrance is a round, green, but barren bluff; the western point of entrance is low and woody. The coast is bold and steep-to, and soundings will not be obtained until the vessel is within the points.

Having opened the entrance, a vessel may pass about 2 cables from the weather point, and when abreast it, bring the whitish brown cliff on the northern shore on a N. by W. $\frac{1}{2}$ W. bearing, and steer for it. When Fisherman point comes open, steer N.N.E., and when it bears E. by S. haul up N.E. or N.E. by E., and anchor in 6 or 7 fathoms, with the point bearing S. by E. or S.S.E., as near it as convenient. The eastern side of the harbour is quite clear, with a bold shore, and a vessel may go far enough in to be quite land-locked. It will be better, however, to wait until the sea breeze has set well in before the harbour is entered. Should there be a land wind, do not come within the depth of 6 fathoms, and when standing to the eastward do not bring the whitish brown cliff to the westward of N.W. by N. to avoid the Fisherman ledge.

If proceeding into the Caymanera, or inner harbour, pass between Hicacal point and Hospital cay; when abreast the north end of the latter, steer for the narrow channel between Toro and Caoba cays, passing about a cable westward of Largo cay; when well through this channel with Media cay bearing E.S.E., alter course for point Salinas, and anchor off the village with the railway depôt on about a West bearing, according to draught.

Beacons.—Four beacons have been placed in this port to indicate the sides of the navigable channel between Pta. del Hicacal and the anchorage; three of these are situated on the western and one on the eastern sides.

They are each surmounted by a board, on which is painted the depth of water in which the beacon is placed; the boards on the western side of the channel are painted white, and that on the eastern side red.

The outer beacon on the western side stands in 8 feet water, at the eastern edge of the sand spit extending from Pta. del Hicacal; from it that point bears West, distant half a cable.

The middle beacon on the western side is placed in 12 feet water, with Cayo de Caoba east extreme bearing North; north extreme of Cayo Largo N.E., and south extreme of Cayo Largo S.E. by E. $\frac{2}{3}$ E.

The inner beacon on the western side is in 10 feet water, with the north-west extreme of Cay Ramon bearing N.E. $\frac{7}{8}$ N.; north extreme of Cayo Media E. $\frac{1}{4}$ S., and Pta. Salinas N.W. by N. $\frac{1}{3}$ N.

The beacon on the eastern side is in 12 feet water, with the north-west extreme of Cayo Ramon bearing N. by E. $\frac{1}{8}$ E.; north-west extreme of Cayo Media N.E. $\frac{1}{2}$ E., and the fort bearing South.

NOTE.—A vessel should keep midway between the inner beacon on the western and that on the eastern side of this channel.

Town.—At Caymanera there are only a few houses and the railway terminus, the town of Guantánamo, 15 miles distant, is connected by a railway.

LIGHT.—In February 1881. a lantern-light was exhibited on each of the two angles of the mole head at port Guantánamo, or Cumberland harbour. The lights are elevated 16 feet above the sea. One lantern has two *white* and two *red* glasses; the other two *white* and two *green* glasses, the coloured glasses being turned towards the bay; the red light marks the northern, and the green light the southern angle, thus indicating the sides as well as the head of the mole.

The Coast from Guantánamo takes a westerly direction for about 20 miles to Berracos point, which forms a remarkable round hill; it is clear of danger and may be approached to the distance of a mile. Thence it trends north-westerly 5 miles, forming the bight of cape Baxa (low), and then resumes its westerly direction to the river Juragua, the entrance to which is about 8 miles from Berracos point. To leeward of the bight of cape Baxa there are three shallow sandy bays, separated by high scarped hills, called los Altares, or the Altars, from the eastern one having a remarkable flattened summit, which are backed by the lofty mountains of Maestra.

From the river Juragua the coast continues westward for 9 miles to the entrance of Santiago de Cuba; between are the mouths of the rivers Sardinero and Aguadores; in the vicinity of the latter several small houses are to be seen. All this part is bold and steep-to, and may be freely approached to the distance of a mile. At 7 or 8 miles eastward of Santiago de Cuba a vessel can anchor in 17 fathoms water, off a valley or break in the land, $1\frac{1}{2}$ miles from the shore. It has been reported that with the Morro castle bearing from N.W. to N. $\frac{1}{2}$ E., distant one mile, there are 4 fathoms rocky bottom, and there is the same depth within 2 cables of the shore.

SANTIAGO de CUBA.*—The locality of this fine port is pointed out from a distance by a remarkable valley, which separates the eastern from the western branch of the Cobre mountains. The latter branch takes its rise a few miles westward of the port; at the distance of about 13 miles it attains an elevation of 3,340 feet, and its wooded heights bound the shore as far as cape Cruz. The lofty peak of Torquino, 8,400 feet high, rising about 50 miles westward of Santiago, becomes here a remarkable object, and under favourable circumstances may be seen from the north coast of Jamaica.

As the port is approached, the entrance may be known by the Morro castle, a fortification of considerable extent on the east point of the harbour, standing on the western extremity of a flat ridge of moderate height 9 miles in length east and west. At a short distance to the northward of the Morro, but on much lower ground on the shore, is the castle of Estrella (now (1877) in ruins) which, however, will not come in sight until the west end of the Morro is brought to bear about N.N.E. Between it and the Morro there is a small inlet with a fort at the head, protecting the landing.

The port of Santiago is capable of admitting vessels of the largest draught, and is secure in all winds. Its entrance, which lies nearly north and south, is about a cable wide, but it narrows a little within until having passed Smith cay, when it begins to widen, and although its course becomes tortuous and winding as the vessel advances towards the inner basin, she will generally sail up when the usual sea breeze has set well in, but should the wind be to the northward she will have to warp in. The city is of considerable dimensions, and the most ancient in the island, and is built on the side of a gentle slope at the north-east corner of the port. The principal exports are coffee and copper ore. In 1863 it contained a population of about 30,000, of whom more than 8,000 were slaves.

* See Admiralty plan :-Port of Santiago de Cuba, No. 443; scale, $m = 4\cdot7$ inches.

Dock.—There is reported to be docking facilities at Santiago for small craft; there is also a place for careening.

Coal.—A supply of coal can always be depended on; water and other supplies are obtainable.

Pilots.—Pilots reside at the small town of Socaba almost at the entrance, and go out when the look-out man makes the signal.

Wharf.—An iron pier 375 feet long has been built on wooden piles on the northern side of La Cruz point; there are 29 feet at the end of it, and 23 feet at the middle; a railroad connects the iron ore mines sixteen miles distant with this pier, and vessels can load 2,000 tons of ore per day.*

LIGHT.—A lighthouse, 23 feet high, built of iron and coloured white, stands a hundred yards eastward of the Morro castle, and exhibits a *white* light, which shows a fixed bright light for 50 seconds and then flashing for 10 seconds. The light is 228 feet above the sea, and should be seen in clear weather 17 miles, but it cannot always be depended upon.

Directions.†—When bound for Santiago de Cuba from the eastward, give the shore a berth of about $1\frac{1}{2}$ or 2 miles to avoid the foul ground off the Morro, until the castle of Estrella (taking care not to mistake Catalina fort for it) comes open. When the latter bears N.E. by N., haul in upon this course, being careful not to bring it to the eastward of that bearing, and pass the Morro point close aboard or at the distance of 50 yards, to avoid the ledge running off from the western point of entrance. Keep the eastern shore aboard until the Estrella is passed, then steer in mid-channel between the shore and Smith cay, on the south end of which there is a small village where pilots reside.

When off the north end of the cay, a *red* and *white* beacon buoy will be seen lying in 8 feet water on the west end of a flat ledge, running off from point Gorda, the inner point of what may be termed the outer channel, which should be left to the eastward. To clear this spit keep the north angle of the Estrella just open of the east side of Smith cay, until the city comes open, when haul up for the inner channel. Having rounded the spit, a *red* beacon with a small cross will be seen on the Colorado shoal, in the middle of the channel, which must be kept to port; Gorda point cliff south of it being clear of danger. Then steer along the eastern shore, which is steep-to, and pass to the southward and eastward of Ratones cay, on which there is a magazine. The beacons in the inner harbour are poles painted white.

Having passed Ratones cay steer about N. by E., passing westward of a *white* beacon on the Compadres, the outer of two small rocks (the

* See U.S. notice to mariners, No. 408 of 1884.

† The buoys and beacons are not to be relied on.

inner one is 2 feet above water*). Then haul up for the city, and anchor according to the vessel's draught, the depth decreasing gradually towards the upper part of the harbour. A vessel will have a good berth in 4 fathoms water, about half a mile from the city, with Ratones cay S.W. $\frac{3}{4}$ S., and Blanca battery, which is painted red, S.E. by E. In leaving, it will be advisable to drop down to the entrance with the sea breeze on the previous evening, to be in readiness for the land wind on the following morning. Strangers should take a pilot.

In order to enter Santiago de Cuba, the wind should be about E.S.E., which will enable a sailing vessel to anchor in the outer part of the port; but to proceed to the anchorage off the town the wind should be as far southward as S.E. by E. so as to weather the Colorado shoal. As the channel is narrow, and the land elevated, it is necessary to carry lofty sail, which alone at times feels the wind. Vessels leave the port with the land wind, which lasts all the year round, and which should be as far northward as N.E. by E., as from the buoy of Gorda point she will have to lie up about S.E. by E., for the channel between Smith cay and Gasper point east of it. With very light wind a sailing vessel should neither enter or leave the port.

In winter, when north-east winds prevail, some days may elapse when vessels are unable to enter under sail, but at other times there is always a breeze from the southward and eastward. During the rainy season, the current is very strong in the channel at the entrance of the port, when it can neither be entered or quitted without a steady breeze.

Tides.—It is high water, full and change, at Santiago de Cuba, at 8h. 30m.; the rise is 2 feet.

Winds.—Within the port, squalls are frequent between May and October, bringing much rain and wind, especially if they come from the north-east; they appear to arise in a great measure from local circumstances, inasmuch as off the coast and even in the channel they are less frequent. The land winds are constant during the night, weak from May until October, but fresh in the dry months and northerly winds; sometimes they begin to blow at 9 p.m., at other times they do not commence until early morning, yet they almost always last until a little before the sea breeze sets in between 9 and 10 a.m.; between the two winds there is an interval of calm.

Sailing vessels should avoid running into the calm near the Morro, especially if there be much sea outside. From May till October storms from the south-east take place all along the coast, when the weather is so

* H.M. Ships *Woodlark*, 1876, and *Rover*, 1877.

thick and dirty as to completely obscure it ; during which it is dangerous to endeavour to make the port, as it is then difficult to recognize, and the sea is so heavy at the entrance as occasionally to close it.

The Coast from Santiago de Cuba takes a westerly direction for about 106 miles to cape Cruz. The shore is bold, lofty, thickly wooded, and forms several bays and anchorages fit for small coasting vessels. The peak of Turquino, 8,400 feet high, rises a short distance inland about 50 miles westward of Santiago; and 37 miles farther on, and 15 miles eastward of Cape Cruz, there is another remarkable mountain, called the Ojo del Toro, 5,190 feet high, which, when seen from the W.S.W., forms two or three hummocks, (see view on chart 2,580). Thence the range decreases in height, and falls by steps to the cape, which is low and woody, and near the extremity of the sandy point there are some huts and a flagstaff.

At 4 miles eastward of the cape the shore is composed of remarkable cliffs about 84 feet high, having horizontal strata resembling fortifications; but near the cape they are copper-coloured, and the strata become perpendicular.

LIGHT.— A *fixed* white light showing a *flash* every 3 minutes, 114 feet above the sea, is exhibited from a lighthouse on cape Cruz, and should be seen 16 miles. The tower is stone, and the keeper's dwelling yellow.

Portillo, about 24 miles eastward of cape Cruz, is the only opening of importance on this part of the shore, where vessels of the heaviest draught will find good anchorage and a watering place. The harbour may be recognized by three perpendicular white cliffs, which form the western side of the entrance, and the low swampy land on the east side. Both points are foul to a short distance, but the reefs are steep-to, and the sea breaks heavily on them. The interior is obstructed by sandbanks, which are pointed out by stakes. There are 7 fathoms water in the centre of the channel, and with the eastern point bearing E.S.E. a quarter of a mile, a vessel will have good anchorage in $5\frac{1}{2}$ or 6 fathoms.

Anchorage.—Soundings appear to extend to a short distance all along this part of the coast, and in moderate weather a vessel may anchor in 6 or 7 fathoms water off the sandy beach at the foot of Turquino. To the westward of Portillo, the depths are 12 to 6 fathoms at from 2 to 4 miles off shore. The soundings are irregular, varying suddenly from 6 to $3\frac{1}{2}$ fathoms; but the bottom is easily seen, and there is no difficulty in picking out a sandy spot.

CAPE CRUZ.*—A reef, which is awash and on which the sea breaks heavily, extends south-westward one mile from the cape, and several shallow patches with $2\frac{1}{2}$ and 3 fathoms water on them lie westward and north-westward nearly 3 miles from the land. There are often a number of fishing stakes on the reef, and its extremity is marked by a pole with a bunch of palm leaves on it; a bank, with from 4 to 7 fathoms water on it, extends 3 miles north-west of the reef. Good anchorage will be found northward of the reef in 4 fathoms, sand, with the cape bearing S.E. $\frac{1}{2}$ E., and the north-east extreme point N.E. by N.

In running down, do not bring Inglés point to bear eastward of E. by N. until Coloradas point, (the second point to the northward of the cape, and of a dark green colour,) comes well open of Cacimba point, to avoid the reef. Cacimba point, the first to the northward of the cape, is sandy, and this is the only sand seen about this part of the coast. When cape Cruz bears E.N.E., two or three hills in connection with the Cobre chain may be seen; pilots reside at the cape.

Limones river.†—The entrance of the river in lat. $19^{\circ} 56' N.$, long. $77^{\circ} 38' W.$, approximate about 8 miles to the north-east of cape Cruz, is bordered by two lines of reefs and has 5 feet least water. The river is navigable for boats to a distance of 3 miles, as far as the landing stage known as Marca de Limones.

Anchorage.—There is anchorage in 4 fathoms to the southward of Limones cay, which lies N.W. by N. about $3\frac{1}{2}$ miles from the entrance of the river, and is the largest and most westerly of the cays in the immediate neighbourhood: the other cays are formed of mangrove trunks washed by the sea. There are two farms on Limones cay.

Guanito Bay and Port Niguero,† are two shallow ports north of Limones river, they are suitable only for vessels of light draught.

MANZANILLO.—From cape Cruz the coast takes a north-east direction for 45 miles to Manzanillo, the port of Bayamo, a large commercial town about 18 miles in the interior. The bay of Manzanillo is formed between the mouth of the river Yara on the north and Caymanera point on the south, a distance of 3 miles. The shore is low and covered with mangroves, and the water is shallow, caused by the deposit brought down during the rainy season, from the rivers Yara, Buey, and Cauto. Six cables N.W. by N. of the fort at the south-west extreme of the town there are about 16 feet water.

* See Admiralty plan:—Soundings off cape Cruz, scale $m = 1.5$ inches, on chart of Cuba, No. 2,580.

† See Admiralty chart 435, [plans of ports at east end of Cuba; scale $m = 4.9$ inches.

About 9 miles W.S.W. of Manzanillo is the point and river of Gua, and $1\frac{1}{2}$ miles N.N.W. of the point are the Gua cays. The passage between these cays and the point carries $1\frac{3}{4}$ fathoms water, over mud. The Manzanillo cays, extending in a S.W. direction over a space of 7 miles, from W.S.W. of the town as far as 4 miles N.W. of it, form a sheltered anchorage. In the middle of these islets there are three good careening places for large vessels, with deep water, and well sheltered.

Most of these cays are covered with mangroves; the two to the north-east alone have a small beach of 20 to 30 yards, where there are two of the three careening places. In the middle of them there is a passage of about 85 yards in breadth with 7, 9, and 11 fathoms water, clean bottom. In the middle of the eastern cay is the third careening place. Perla cay is at the south-west extreme, and which with Gua cays form a channel about a cable in breadth, with $6\frac{1}{2}$ and 7 fathoms water, mud.

The extensive chain of banks, reefs, and cays which skirts this part of the coast of Cuba commences about 15 miles to the north-east of Cape Cruz, with the great bank of Buena Esperanza, and extends as far westward as Maria Aguilar point close to Trinidad. The entrance towards Manzanillo is by the narrow channel of Balandras, formed by the cays at the south-east extreme of Buena Esperanza and those bordering the coast of Cuba, and which has from $2\frac{3}{4}$ to $3\frac{3}{4}$ fathoms water.

In proceeding from this channel to the north-east in 7 to 8 fathoms water, the cays of Gua and Manzanillo will be seen about 22 miles, and a vessel should steer for the passage between them. There is another passage more to the westward named Barcos, which leads to the anchorage, but it requires the aid of a pilot. About 12 miles northward of Manzanillo is the entrance to the river Cauto, one of the deepest in Cuba, and although the bar can only be crossed by boats at high water, it is navigable for 60 miles. The entrance to the channel of Balandras is narrow and intricate, and although marked on either side by stakes, a stranger in a large vessel should take a pilot.

Tides.—It is high water, full and change, at Manzanillo, at 10h. 40m.; the rise is 3 or 4 feet. The water is highest during the months of September and October, with the wind from South and S.W.

Caution.—The bank of soundings is quite clear of danger between cape Cruz and the eastern head of the Doce Leguas cays, and a vessel may stand in to 7 fathoms on any part of it, save only from about 8 miles N.N.W. from the cape as far as the nameless cay (Cayo Palomino) which marks the southern extremity of the Great bank of Buena Esperanza; within those limits it is not safe for a vessel of any size to go within the depth of 10 fathoms, the ground being intersected with numerous rocky ridges, some of which are nearly awash.

Caution.—It may be well here to remark, that our knowledge of the shores of Cuba is very imperfect, especially the southern, between cape Cruz and cape Corrientes; also that the only reliable positions on the chart—and those particularly mentioned in this work—for this part of the coast are, cape Cruz; East cay, and south-west point of cay Largo on Jardines bank; Dry shingle to the south-west of Rosario channel; south extreme of the isle of Pines; Frances point, isle of Pines; and cape Corrientes; all of which were determined by Capt. R. Owen, in 1830.

Directions from Cape Cruz to Manzanillo.—The channels leading to Manzanillo, being intricate and little known, should not be taken by strangers without a pilot; small vessels, however, may navigate them by carefully attending to the following directions:—

Rounding cape Cruz, give a good berth to the shallow patches westward of it, before hauling to the northward. When Cacimba point bears East, about 3 miles, steer N. by E. until Colorado point bears about E.S.E., when a stake will be seen on the edge of the shoal extending off it; leave this stake to starboard, about 2 cables distant, and alter course to N.E. by E., which will lead to a stake on the Borlon rock, which leave 2 cables on the port hand.

When this stake is passed, steer N.N.E. leaving 3 stakes to starboard 2 cables distant, on the shoals extending off Borlon point, and one stake to port, on Arriola rock.

Then steer N. by E. $\frac{1}{2}$ E. for the Azuaga pass, which is marked by a stake on either side; pass midway between them, and then steer N.E. for the Balandras channel, the course through which is N.N.E., and the depth about $2\frac{3}{4}$ fathoms; keep on the west side of the channel, and about a cable from the cay, giving the stakes on the N.E. side a wide berth.

All is clear from this onward, the channel 6 miles wide between the main land and the Great bank of Buena Esperanza, and the depth 7 to 10 fathoms throughout. Steer N.E. for Gua cays, and when the vessels at anchor off Manzanillo bear E.N.E. steer for them between Gua and Perla cays, and carrying a depth of 5 fathoms. The water will shoal gradually to 2 fathoms at three-quarters of a mile from the town; the best anchorage, soft mud, is off the northern part of the town.

In 1868, H.M.S. *Niobe* was piloted through a channel westward of the Balandras, called the Balamina, and which, it is stated, would be navigable for the largest class of ship if properly staked and buoyed.*

Buena Esperanza bank.—From Balandras channel, the white sand-bank of Buena Esperanza takes a westerly direction for 10 miles

* Navigating Lieutenant E. H. C. Smith, R.N.

to a small cay lying N. by W. 17 miles from cape Cruz. Thence it trends in a northerly direction for 18 miles, and then bends to the W.N.W. 13 miles to Cuatro Reales channel, which is the eastern passage to Santa Cruz, having formed in this last distance the two passages called Barcos and Pitajaya. The entrance of Cuatro Reales channel bears N.W. by N. 42 miles from cape Cruz, (the chart, however, places the entrance in a N.N.W. $\frac{1}{4}$ W. direction from the cape,) and about 14 miles from the main land to the northward.

Santa Cruz is only fit for vessels of light draught. When bound here, it is recommended after rounding cape Cruz reef to steer about N. by W. $\frac{1}{2}$ W., which will lead up to some small cays, 11 in number, lying in an east and west direction; the channel of Cuatro Reales lies between them; the two westernmost are the largest of the group, and 4 miles apart. The easternmost cay is called Ceiba, and is distinguished by some round-topped trees on its centre. Close to windward of this cay is a low sandy cay unlike any other in this neighbourhood, and therefore a good guide; near it is the cay on which the pilots reside, who are relieved monthly. The least water in this channel, $2\frac{3}{4}$ fathoms, will be found about 2 miles to westward of Ceiba cay just mentioned. The channel to Santa Cruz is narrow and intricate, but the water is so clear and the shoals visible and steep-to, that the eye is a sufficient guide.

Directions.—In navigating outside these cays, regular depths will be obtained of from 20 to 8 fathoms. From abreast cape Cruz the edge of the bank of soundings takes a northerly direction and approaches to about 4 miles off at the east end of the Doce Leguas group. On the edge, the bottom is generally rocky, but within the depth of 10 fathoms anchorage will be found on sandy bottom.

***Cuatro Reales Channel.**—Having passed Ceiba cay, steer about N. by W., leaving on the eastern side the Media Luna cay, and on the western side the group called Mordazo. When on the parallel of the most northern of the latter cays, steer westward between them and those of the Carenero on the coast, in from $3\frac{3}{4}$ to $5\frac{1}{2}$ fathoms water. The Carenero cays are two in number, and lie on the east side of entrance to the anchorage of Santa Cruz; and on the west side are two other cays, named Pinipiniche. Anchor with the houses of the town bearing from N.E. to N.W.

East Channel, is formed between the eastern cay of Doce Leguas and an extensive sand-bank, on the western part of which lie the Uvero

* See Caution, page 386.

cays. The shoals are easily seen in clear weather, when the eye will be the best guide. Steer to the northward, and pass one mile westward of the extremity of the reef which bounds the eastern side of the channel. From off the white sand-bank steer N.N.E., and pass between three cays, leaving two on the eastern side, in from 11 to 12 fathoms water. Having passed these three cays, steer for the most eastern of the Pilon, a group of four cays lying in a W.N.W. and E.S.E. direction.

When at a less distance than a mile of the most eastern cay, the channel of Mate will be seen, which can be entered by bringing the north point of the eastern cay of the Pilon group to bear N.W. by W. $\frac{1}{3}$ W., and steering S.E. by E. $\frac{1}{3}$ E.; or a better route is to pass between the eastern cay of the Pilon group and the Mate cays, rounding the north side of the latter and steering between them and the coast of Cuba; in the middle of these channels the depths are $2\frac{3}{4}$ fathoms. When eastward of Mate cays, keep the coast aboard, and in $5\frac{1}{2}$ fathoms water, until about half a mile southward of Pinipiniche cays, when the town will be seen and a vessel can anchor as before.

Tides.—It is high water, full and change, at Santa Cruz, at noon, and the rise is 4 feet; but the tides are greatly influenced by the strength of the wind.

Laberinto de Doce Leguas, or Twelve league labyrinth, is a range of low, bushy cays, with sandy beaches, extending in a W.N.W. and E.S.E. direction, 70 miles. They are steep-to; the lead is therefore no guide, and in the night they should be given a wide berth. The easternmost islet, which lies N.W. 56 miles from cape Cruz, and cay Breton, the westernmost, are 15 and 25 miles from the main land, but in the centre they are nearly 30 miles from the nearest shore. The space within, called the White ground, from its clear white sandy bottom, is studded with small islets, with deep water between them.

There are several channels leading through the outer cays for vessels of about 14 feet draught, but a pilot is necessary, and one may be obtained at cape Cruz, or from the Cayman turtling vessels, which are generally to be met with in the neighbourhood. The principal openings are East channel, at the extreme east end of the range; Caballones channel, 38 miles to leeward of this, and Boca Grande, 22 miles farther; and being wide they can be easily recognized.

Bank inside the Laberinto de Doce Leguas.—This extensive tract has generally depths of from 5 to 12 fathoms, over a very soft white marly bottom, the mud from which almost always discolours the water, and greatly adds to the dangers of the pilotage. The

whole space is covered with groups of low cays, very inaccurately laid down on all charts, and their names are in much confusion.

There are several excellent harbours or lagoons formed by these cays, in which a hurricane might be weathered, but they cannot be found without a pilot. The most convenient is in a group of cays called the Brigands, which lie N. by W. 15 miles from the Caballones channel. The outer anchorage is in a large bay formed by a semicircle of cays and reefs, which may be boldly entered from the north or west, and affords good shelter from all winds between S.W. round by south and east to N.N.E. Anchor with a small sandy cay upon the middle of the reef, connecting the westernmost cay with the rest of the group, bearing S. by E. $\frac{1}{4}$ E., distant three-quarters of a mile. A vessel will here be in 7 fathoms water, good holding ground, and in case of extreme bad weather may go into the inner lagoon, through a 3-fathoms channel which will be seen open close to the eastward, where she will be quite land or reef locked. The position of this anchorage is in lat. $21^{\circ} 6' N.$, long. $78^{\circ} 56' W.$ *

In addition to these cays many parts of this region are thickly covered with mushroom-shaped coral shoals, which suddenly rise from soundings of 5 to 11 fathoms to just awash, with deep water between; with a boat a-head and a good look-out, a steamer may pass between them, but at considerable risk. They are especially thick in the space extending from 5 miles north of the Boca Grande to within 10 miles of the mainland, and the channel to the eastward of Burgao cay passes through the most dangerous of them, and should not be used.

Slavers are frequently run through the Boca Grande or Caballones channel, for a convenient cay inside, their cargoes being carried to the mainland in small parties by droghers.

The Tides set directly on and off the bank with great strength.

†**Breton cay**, the westernmost islet of the Doce Leguas, should be rounded very cautiously, as a reef steep-to extends S.W. $3\frac{1}{2}$ miles from it, on which the sea generally breaks. There is anchorage under the west side of the cay, in $4\frac{1}{2}$ fathoms, with the north-west end bearing N.E. $\frac{1}{2}$ N., and the south-east end E. $\frac{1}{2}$ S. Should the vessel have to work up to it, which will probably be the case, having rounded the west end of the reef in standing to the northward do not bring the north-west end of the cay to the southward of E. by S. $\frac{1}{2}$ S., and on making a board to the southward

* The Derrotero de las Antillas for 1863 says:—"We cannot affirm that this anchorage is exactly that of the Palomas cays, or any others." The position here given is about 5 miles N.N.E. of those cays as marked in the present chart of 1865. See Caution, p. 385.

† See Admiralty charts, Nos. 2,580 and 2,579:—Cuba, east and west parts.

the same point should not be brought to the northward of N.E. by E. This anchorage is well sheltered from N. by E. to S.W.

This is the most dangerous part of the coast, and is seldom without a wreck upon it, for although the reef is awash, there is often but little break to show it, and the apparent termination of the cays induces strangers to haul close round, which, at night, is certain destruction. A vessel may haul round the extremity of the reef, and find good anchorage and shelter from all easterly and northerly winds; but in standing into a less depth than 4 fathoms keep a sharp look-out for rocky heads.

There is a passage through the reef to the north-west of Breton cay with $2\frac{1}{2}$ fathoms in it, but it is crooked, narrow, rocky, and known only to a few of the Cayman fishermen, who navigate it by the eye. There is a powerful indraught towards this passage on the flood, which frequently takes command of vessels passing the reef end too closely, where they are liable to be becalmed, and obliged to anchor in an exposed position.

Zarza de Fuera cay.—From Breton cay the reef takes a N.N.W. direction for 23 miles, and terminates half a mile northward of Zarza de Fuera cay, which is low, sandy, thickly wooded, and lies about 3 miles eastward of the north-west point of the reef, and about 8 miles from Zarza point, the nearest part of the Cuba shore. The reef, without any cays upon it, except an occasional dry patch of sand, is very steep to in all parts, having 10 fathoms water alongside it, and 200 fathoms about a mile off; it trends from half a mile off the north side of the cay to about 4 miles eastward of it.*

A vessel should pass 4 miles westward of Zarza de Fuera cay, and when it bears East, if wishing to enter upon the bank, the vessel may be hauled up N.E., the edge of the bank being quite clear for 9 miles, or within 2 miles of Machos de Fuera cay. After striking soundings, the water will shoal almost immediately to 5 fathoms, and then deepen to 6 and 9 fathoms, with occasional patches of 4 fathoms as the vessel advances along the channel, which is quite clear between the mainland and Zarza de Fuera cay and that of Médanos de Manati, which latter marks the north extreme of the shoals extending from near the Boca Grande. The Médanos are very inaccurately laid down on all charts; their position should be in about $21^{\circ} 27' N.$, long. $79^{\circ} 16' W.$, and the coast of the

* The western line of direction of the reef is very doubtful. H.M. brig *Espiegle* in 1828 is said to have grounded on the edge, in 14 feet water, with the Pan de Azúcar (Sugar-loaf) in one with Zarza de Fuera cay, bearing N. $\frac{1}{2}$ E., and Breton cay S.E. by E. $\frac{1}{2}$ E., which would place the edge some 4 miles westward of the present charts. The Derrotero de las Antillas for 1863 makes the Pan when in one with Zarza de Fuera cay bear N. $5^{\circ} W.$ true. See Caution at page 385.

mainland is laid down about 7 miles too far south, at least as far east as Pasabanao point.

There is fair shelter and excellent holding ground along this part of the mainland, and no danger as long as the beach is in sight. The low swampy shore, within the line of the Doce Leguas, abounds in mahogany and other woods, which are shipped chiefly in vessels not drawing over 15 feet water, that are able to get to Santa Cruz and the river Jatibonico, the entrance to which is 30 miles to the northward of the Boca Grande.

If bound for Trinidad, after passing Zarza de Fuera cay, instead of entering upon the bank of soundings, steer to the N.W., and after sighting Machos de Fuera cay steer W.N.W. for Blanco cay. When the Sugar-loaf is shut in behind Banao hill, Machos de Fuera cay will bear North, a knowledge of which will save strangers much doubt when they cannot recognize the land in the vicinity of Trinidad.

Caballones channel is the first practicable entrance from the eastward through the reefs of Laberinto de Doce Leguas for anything larger than a boat. It may be easily recognised by its width, about 2 miles, none of the breaks in the line of cays to the eastward of it being more than half a mile wide, also by a remarkable cocoa-nut tree standing about a mile westward of it; the cocoa-nut is very rare on these cays, the prevailing tree being the stunted palm.

There are only $2\frac{1}{4}$ fathoms water in this channel, and a depth not less than this extends over the outer or south-west part of the opening; but the channel is contracted within by two spits extending from its western and one from its eastern side, between which it is not more than 2 cables wide, and must be navigated by the eye, there being no good leading marks. After passing this narrow, the water will deepen to 8 and 9 fathoms. Black-mangrove point, the inner western point of the channel, and Pilot point, the outer eastern point, lie nearly north and south of each other.

Having entered, a North course will lead up between Bergantin and Manuel Gomez cays. The former lies 6 miles northward of the east end of Caballones, which forms the western side of the channel. Thence steer N. by W. 18 miles, which will bring the vessel to the north-east end of Yagua reef, and then a N.W. course 18 miles will lead to the entrance of the river Jatibonico. These directions, however, require the assistance of a pilot. This channel is one of the best fishing grounds upon the south coast of Cuba. A considerable supply of fish may be caught in an hour or two, either by towing or bottom fishing, or by seine. The beach on the western side is much frequented by turtle.

Pilots.—Some fishermen, who are always ready to act as pilots, live about half a mile eastward of Pilot point.

Anchorage.—The best anchorage for small craft is in $2\frac{1}{2}$ fathoms, about a mile north of Pilot point, secure from all winds except those between South, round westerly, to W.N.W., which are very rare. Should the wind come from this quarter a vessel can always run through the channel, and anchor under the lee of the cays.

Boca Grande, lying 20 miles W.N.W. of the Caballones, is about 3 miles wide, and carries not less than $2\frac{1}{4}$ fathoms all over it, except within half a mile of either shore. Entering from the eastward do not round the reef too closely, as it projects about $1\frac{1}{2}$ miles to the southward from the western extreme of Grande cay; it may, however, be safely rounded by the eye. It is the best channel to take when bound to the river Jatibonico, and is the westernmost navigable opening through the Doce Leguas. Having entered between the cays, steer N.N.E. $\frac{1}{2}$ E., which will lead to windward of Rabiorecado and Burgao cays. Rabiorecado say lies 7 miles northward of the west end of Grande cay, which forms the eastern side of the Boca Grande.

The depths will be from 9 to 12 fathoms, and the vessel will pass to the westward of several coral patches, which may be easily seen from aloft, and are steep-to. From Burgao cay, a N. $\frac{1}{2}$ W. course will lead up to the mouth of the river, where large quantities of mahogany and cedar are shipped. When the sea is moderately smooth, the Boca Grande is a safe entrance for vessels up to 15 feet draught, but those of that draught should keep rather to the westward of mid-channel.*

Anchorage.—There are two indifferent anchorages at the entrance of the Boca Grande. The first is from 4 to 7 fathoms in the bight of the reef on the eastern side of the channel, with the west point of Grande cay bearing N. by E. $\frac{1}{4}$ E., distant one mile. Excellent shelter, which will not be found in any other part of the entrance, will be found here against the prevailing N.E. winds; it is also out of the influence of the tide, but the position is unsafe for a sailing vessel if the wind should veer to the southward or westward, and with these winds she will not be able to leave on the flood.

The other anchorage, in $2\frac{1}{2}$ fathoms, and sheltered from West and N.W., is on the western side of the channel, with the south part of the Cinco Bolas cays bearing about W.S.W., and the north-east part N. $\frac{1}{2}$ E.; it is, however, in the full rush of the tides, and is open to north-east gales, and with these winds there will be a dangerous reef astern.

Tides and winds.—The tides are very strong and variable, and a vessel should anchor during the night, which she can do so in safety. The stream runs in and out of the Boca Grande at the rate of from one to

* Commander A. F. R. de Horsey, H.M.S. *Victor*, 1857.

2½ knots. Near the mainland, in the early part of the morning, the wind is more northerly than at any other part of the day, and it draws round gradually with the sun; the land wind comes off soon after sunset.

The Coast between the river Jatibonico and Pasabanao point 6 miles westward, forms a bay in which there are 2½ and 3 fathoms water. From this point the coast trends W.N.W. 6 miles to Manati point, and nearly midway between there is a small creek called Caobas, in which there are 6 feet water. From thence to Tolete point, 6 miles to the W. by N., the shore forms a bight, near the centre of which is the Estero Nuevo (new creek).

At 8 miles South of Manati point is the north end of the extensive bank, Médanos de Manati, and in the channel between, the soundings are from 6 to 8 fathoms, the depths generally decreasing as the shore is approached. Between Tolete and Zarza points, 4½ miles to the W.N.W., the bight is a little deeper, and in the middle of it is the small shallow creek San Marcos.

Water.—Good water may be obtained about 3 miles up the river Jatibonico; and at Manati point there are some wells, but the water is not so good.

River Zarza,* which disembogues close on the east side of Zarza point, is navigable for canoes for some distance, and communicates with the town of Sancti Espiritu, 26 miles inland. The water, however, is not fit for use until 24 miles from the mouth.

Two small cays lie about a quarter of a mile to the southward of Zarza point, and a reef extends off them about a mile. Within the cays there is good shelter for small vessels in 3 fathoms, over a clay bottom. To the westward of Zarza point is the creek of the same name, with a depth of 6 feet water, where small coasters find shelter from south-east winds.

Tunas, westward of Zarza point, is the seaport of Sancti Espiritu, with which it is connected by a railroad.

Vessels bound to Tunas will find the Trinidad range of mountains, which can be seen 30 miles off, a good landmark; also the range to the eastward, separated from the former by low land.

When Banoa, the eastern mountain, bears N. ½ E., a course may be steered over the bank, and as the land is neared, the harbours will be known by Blanco Zarza cay, westward of it, as well as by the tall chimneys of the sugar mills, to the eastward of the port.

Blanco Zarza cay, lying 1¾ miles to the southward of Caney point, is a small islet with a lagoon in the centre, covered with trees,

* See Admiralty chart :—Cuba, Western portion, No. 2,579; scale, $m = 0.12$ of an inch.

and having a white sandy beach; a few huts are on the eastern end, where it is said pilots may be procured. It is foul S.W. for a mile, S.E. three-quarters of a mile, and N.E. nearly a mile, leaving a passage between it and the shore half a mile wide, with a depth of 3 fathoms; this channel is better than the one eastward of the islet. The cay lies about 8 miles N.N.W. of Zarza de Fuera cay, and between them the depth is from 6 to 10 fathoms; but near the edge of the bank there is an isolated spot with 4 fathoms, within which a vessel will find good anchorage.

Three miles W.N.W. of Zarza point is Caney point, to the westward of which is a small creek with 6 feet water, and 6 miles farther to leeward is Ciego point. In the bay between them, there are from 3 to 5 fathoms water; and near the centre is the river Tallabacoa, which has very little water in the dry season. Half a mile westward of Ciego point is that of Iguanojo, with a ledge running off it for half a mile.

Water.—There is a brook of good water a little westward of the river Tallabacoa. It will also be found fresh and fit for drinking about 3 miles above the mouth of the Iguanojo.

Tierra cays.*—From the river Iguanojo the shore takes a W.N.W. direction 4 miles, and then turns abruptly to the southward for 2 miles to Agabama point. From the latter a narrow ledge extends off 6 miles to the south-east, leaving between it and the Iguanojo, on the opposite shore, a deep bight called St. Pedro, in which there are from $3\frac{1}{2}$ to 6 fathoms water, clay bottom.

From Agabama point the Tierra cays extend out to the distance of half a mile; and $2\frac{3}{4}$ miles S.S.E. of these, and $2\frac{1}{2}$ miles from the edge of the ledge, is Machos de Fuera cay, having a reef extending from one to 2 miles eastward of it. At Agabama point, the river of the same name runs into the sea, but the water is not good until 18 miles from its mouth. The coast from Agabama point as far as Casilda point, is covered with mangroves, very low and swampy; and from the latter to Guaurabo point (or River) is of sand and steep rock.

Sierra de Sancti Espiritu.—About 10 miles in the interior this range rises into irregular hills of considerable elevation, and two of the peaks are very remarkable, and serve as good marks after passing westward of Breton cay. The north-easternmost peak, the Sugar-loaf, is 12 miles from the shore, and may be readily known by its flattened summit. Loma de Banao peak is distinct, and about 4 miles S.W. of the Sugar-loaf. At 20 miles westward of Banao is Potrerillo peak, which bears N.N.W. 4 miles from the town of Trinidad, and is a good guide for it, as it may be seen 60 miles.

* See Admiralty chart, No. 2579; scale, $m = 0.12$ inch. Also Admiralty plan, No. 98; scale, $m = 1.28$ inches. Approaches to Port Casida and Masio.

Trinidad stands on high land, 3 miles from the sea, on the left bank of the river Guaurabo, which disembogues about 3 miles westward of the town, and is navigable for canoes to within a mile of it; the greater part of the commerce, however, is shipped at port Casilda, distant $2\frac{1}{2}$ miles, and at port Masio, distant $4\frac{1}{3}$ miles. The town rises on the slope of a remarkable saddle hill, and a conspicuous church in the upper part of it is 700 feet above the sea. When seen from the west and south-west, this hill has the appearance of a gunner's quoin detached from the main. In 1863 the town contained a population of 10,000, of whom about 2,000 were slaves.

Ports of Trinidad.*—From Agamaba point to Maria Aguilar point, 9 miles W. by N. of it, and $3\frac{1}{2}$ miles S.S.E. of the mouth of the Guaurabo, the shore is deeply indented, forming four small inlets. Jobabo bay, the easternmost, is only fit for coasters; Caballones, the next, has a depth of from 3 to 4 fathoms; port Masio has a greater depth than the others; and port Casilda, the westernmost, has from $2\frac{3}{4}$ to 4 fathoms, muddy bottom. The shore is skirted by numerous cays, reefs, and banks, to the distance of from 2 to 3 miles, and the channels, although deep, are so intricate, that a pilot is absolutely necessary. The weathermost channel lies between Machos de Feura cay and a small narrow ledge about half a mile to the westward of it, and has a depth of 3 fathoms, but it is by no means to be recommended, and the sand-banks are not stationary.

At $2\frac{1}{2}$ miles to the westward of Machos cay is Puga cay, almost level with the sea, which sometimes breaks over it. Tall mangrove trees have grown on this cay, rendering it somewhat conspicuous.

Blanco Cay is a small low woody islet, about 20 feet high, with a lagoon in the centre, lying W.N.W. 3 miles from Puga cay. It is the most western of all these cays. When seen from the south-westward this cay appears wedge-shaped, the higher part being to the south-eastward.

The cay is about half a mile long in an East and West direction, with a rocky ledge, partly uncovered, extending about 2 cables W.S.W. from the west extreme; its shores are of white rock, the south end sandy, and on the north end is a hut the residence of the pilots. From the cay, the eastern part of mount Banao bears N.E. $\frac{1}{2}$ E., and Potrerillo peak N.N.W. $\frac{3}{4}$ W. The best channel lies between Blanco and Puga cays. Should a vessel have to wait for a pilot, which is very probable, there is anchorage in $9\frac{1}{4}$ fathoms, with Blanco cay N.E., distant about a mile; but be careful to look for a clear sandy spot.

To seaward these reefs are steep-to, and 5 fathoms will be found close up to Blanco cay, but a reef extends 3 cables from its western extremity,

* See Admiralty plan, No. 98; scale, $m = 1\cdot28$ inches.

which may be safely rounded by the eye, and anchorage and good shelter found in 3 fathoms to the north-west of the cay. There is no safe opening westward, except for coasters drawing under 12 feet.

Port Masio will be found the most convenient harbour, as a vessel can get in and out easily with the prevailing winds; but neither of these places is adapted for vessels drawing over 15 feet water. Those of heavier draught may anchor within the Blanco channel in from 3 to 4 fathoms, with Blanco cay bearing W. by S., and Puga cay S. by E. In a case of necessity, however, the following directions might be useful, as most of the shoals may be seen from aloft in clear weather.

Directions.—A vessel bound to port Masio should enter by the channel between Blanco cay and Puga reef. Pass the east end of Blanco cay at the distance of about 2 cables, and steer N.E. or N.E. by N. until the cay bears West, when, if necessary to await a pilot, it will be prudent to anchor in about 3 or 4 fathoms water, mud and weed; if not, proceed as follows:—Having entered the channel, or brought the southern part of Blanco cay to bear W. $\frac{3}{4}$ S., and the middle of Puga cay S.E. $\frac{1}{2}$ S., steer N.W. $\frac{1}{2}$ W., and it will lead between the ledge, which runs off to the north-east from Blanco cay for three-quarters of a mile, and the Cascajal bank to the eastward, parts of which are nearly awash.

When Jobabo point (which is sandy) bears N. $\frac{3}{4}$ W., steer N.N.W. for the west point of the harbour, keeping over towards Guard-house point, which separates Jobabo from Caballones, until it is passed, when the eye must be the guide for mid-channel, the edges of the shoals on either side being clearly visible. A berth may be chosen according to the vessel's draught, only taking care to avoid a mud-bank, extending from the wharf on the western shore to nearly the centre of the harbour, the outer end of which bears N. $\frac{1}{4}$ E. from the west point of the entrance. If more convenient, instead of proceeding thus far, the vessel may haul into Caballones bay without any difficulty.

Port Casilda.*—A vessel proceeding to this port should obtain a pilot at Blanco cay, as the approaches from seaward are narrow and tortuous, but it may, with care and attention to the following directions, be entered without a pilot by a vessel drawing not more than 15 feet, but it will be prudent to have a boat sounding a-head. The channel is not more than 100 yards wide. Merchant vessels are obliged to take a pilot at Blanco cay.

Coal.—A small supply of coal may at times be obtained at Port Casilda.

* See Admiralty plan, No. 98; scale, $m = 1.28$ inches :—Approaches to Ports Casilda and Masio.

The channel to Casilda is the same as that for port Masio until at a mile to the south-eastward of Masio entrance. From this point steer W.N.W. for a quarter of a mile, through the narrowest part of the channel, with only $2\frac{3}{4}$ fathoms water; alter course to S.W. by W. for 2 miles, when Casilda harbour will be well open; then steer N.N.W. for 2 miles to the entrance, keeping on the western side to avoid the long sand spit running across the entrance from the east side.

Several stakes mark this channel, but they are often shifted to prevent strangers from knowing the pilotage.

Mulátos Channel is shorter and more convenient than the above, and 15 feet water will be carried through, but a pilot is necessary.* To enter it from Blanco cay, coast along the reef to the north-westward, neglecting several breaks, which will be seen in the line of reef, until the Vigia, or look-out house, a conspicuous white building upon the hill immediately above the town of Trinidad, bears N. $\frac{1}{2}$ W., when the termination of the reef, marked by a stake, will be seen. Haul round this stake and steer N.E., which will lead along a line of stakes on the starboard hand; at from one to 2 cables from these stakes there will not be a less depth than 11 feet.

A projecting cay, named Guayro, will now be upon the starboard bow, and when it bears E. by N. steer North, which will lead close to the Middle shoal; leaving the three stakes on this shoal on the port hand, proceed as before. The interior of the port is only 4 cables in extent, and although nearly 2 miles nearer Trinidad than port Masio, a vessel will have to send to the Guaurabo for water. There are also one or two other small channels, but as no clear and direct marks can be given for them, it will be wise to take a pilot. Should it be necessary to stand off and on, in approaching the outer part of the reef do not bring the fort to the eastward of E.N.E., to avoid the Mulátos reef which runs off to the westward of the fort.

Tides.—The tides in the offing set S.W. and N.E., about half a knot an hour; the rise is about $1\frac{1}{4}$ feet, but south-east winds increase it to 3 feet.

River Guaurabo.—If wishing to communicate with the town of Trinidad, the above difficult pilotage may be avoided by proceeding to the little bay formed at the mouth of the river Guaurabo, which affords excellent shelter with the wind from South, round easterly, to N.W.; a S.W. gale, however, would be fatal. To this end, instead of entering the Mulátos channel, continue to the north-westward, and after rounding Maria Aguilar point, the shore may be passed close to until the town bears East, when the bay will open out.

* H.M.S. *Woodlark*, 1875.

Give Ciriales, the south point of this bay, a berth of $1\frac{1}{2}$ cables, and steer in E.N.E. for the mouth of the river, and when the point bears South, anchor in 8 fathoms water. This is the best position the bay affords, for though it is apparently roomy, there is not space for more than one vessel, the greatest part of its area being covered with rocks, having not more than 6 feet water over them; it will be prudent to moor, if intending to make any stay.

This anchorage will be found very convenient for communicating with Trinidad by pulling 3 miles up the river in a boat to where a bridge crosses it, when there will be a walk of three-quarters of a mile to the town. The Spanish authorities have always been jealous of any communication in this direction, on account of smuggling; and some years ago they partially filled up the mouth of the river, which was then navigable for small vessels as far as the bridge. Coasters when light can cross the bar. Water may be obtained from the river.

Paz bank is pear-shaped, 10 miles long in a W.N.W. and E.S.E. direction, and $3\frac{1}{2}$ miles wide at its broad end, which is to the eastward; this part is sandy, and in moderate weather a vessel may anchor on it. The general depth on the bank is from 12 to 20 fathoms, and towards the north-west end it is rocky. The centre of the east end lies South 16 miles from Machos de Fuera cay, and S.W. $\frac{3}{4}$ W. 14 miles from Zarza de Fuera cay.

The coast from the river Guaurabo runs about W. by N. for 8 miles to Muño point, west of the river Hondo; thence a little more northerly for 9 miles farther to San Juan point, one mile beyond which is the mouth of the river Guayximico. It is of steep rocky cliffs, and the land mountainous as far as a little westward of San Juan point, where the chain named Trinidad terminates. It is all along clear of danger with the exception of a reef extending off less than half a mile, between the mouths of the rivers Yaguanabo and San Juan, and may be approached to a distance of 3 miles. Between are the rivers Guanayara, Cabagan, Hondo, Yaguanabo, and San Juan, which coasters of 6 feet draught can enter. Water may be obtained from these rivers about 3 miles up.

From the Guayximico the coast trends north-westward for 14 miles to Colorados point, which may be approached to the distance of half a cable. The land is flat, and between, the rivers Gavilan, Gavilancito, and Arimao run into the sea, but they are of no importance. From port Xagua the coast runs nearly West for 21 miles to Caléta Buena point (good cove), thence it trends a little northward for 7 miles farther to Oriental, the east point of Cochinos bay. It is composed chiefly of white rocky cliffs, and is clear of danger.

PORT XAGUA or CIENFUEGOS,* is quite secure in all winds, with a depth sufficient for vessels of the heaviest draught; but its channel is so narrow and tortuous, and the tides are so strong, that it is very difficult to navigate. The entrance between Colorados point on the east, and Sabanilla or Vigia point on the west, is a mile and a quarter wide, (the bank fringing the coast on the western side of entrance to this port is reported to extend farther from the shore than was formerly supposed, at midway between Pta. de la Sabanilla and Angeles castle); but 2 miles within, between Pasacaballos and Sta. Angeles points, it is narrowed to little more than a cable across, and here takes a sharp turn from N.W. to N.N.E., carrying the same breadth for three-quarters of a mile to Mirpa (or Milpa) point on the east at the inner end of the channel, when it opens out into a large harbour.

In 1884, 305 vessels of the aggregate tonnage of 160,707 tons entered this port, exclusive of the coasting trade; the value of exports was 1,241,238*l*; vessels not exceeding 200 feet in length and 12 feet draught can be docked on the Marine Railway. Wet dock accommodation for vessels ~~under 12 feet~~, and limited to vessels of 14½ feet. There are two patent slips; vessels 200 feet long, drawing 12 feet aft and 8 feet forward, can be taken on the larger slip. Seamen are admitted into the Public hospital. The population according to last census is 23,000. Lines of steamers run to Liverpool and New York, and there are two coasting steamers weekly; the railway is open to Havana and to other towns; there is a direct telegraphic line to Europe and the United States as well as to all the West India Islands. There is every facility for coaling, and a good supply always on hand. Repairs of all kinds to hull and machinery can be done. Supplies of fresh beef and vegetables are abundant at all times.

LIGHT.—A lighthouse, 45 feet high, with Villanueva† painted on it, stands on Colorados point, the eastern side of entrance to port Xagua, and exhibits, 81 feet above the sea, a *fixed* and *flashing* white light, visible 14 miles; the light apparatus revolves every two minutes.

Pilots are in attendance at all times near the entrance to the port.

Directions.—When bound for port Xagua give the shore eastward of the lighthouse a berth of a mile, to avoid some foul ground. Having entered between the points, a mid-channel course inclining towards the weather shore should be steered as far as Pasacaballos point, when it will be better to keep rather nearer the lee or western shore. After passing Mirpa point, steer N. by W. to avoid Mirpa bank lying about 3 cables

* See Admiralty plan :—Port Xagua or Cienfuegos, No. 444; scale, $m=2.3$ inches.

† It is doubtful if the name is kept painted; it was not so in 1878.

northward of the point. When the north end of Alcatraz cay bears E. $\frac{1}{4}$ S., the vessel will be within the shoal, and may haul up, and anchor as convenient in 7 or 10 fathoms water, in what may be called the outer basin; or if proceeding into the inner basin, the south-west end of Carenas cay may be rounded at the distance of a cable. (The shoal stretching from the south-west extreme of this cay is reported to be extending; vessels when entering must keep close along the mainland.) When a North course should be steered till the northern extreme of the same cay bears S.E., then alter course to N.W. with that bearing on, and when the church tower in the eastern part of the town bears N. by E. $\frac{1}{2}$ E. (see view on plan), steer for it, and anchor as convenient, remembering that shoals extend for a considerable distance from both Gorda and Antunez (or Majagua) points; but this channel, although deep, is narrow, intricate, and requires a pilot. Carenas cay is connected by a shoal to the main land north-east of it. It is stated that the banks in the vicinity of the anchorage are extending in consequence of ballast being discharged into the harbour and also from the river deposits. The town stands on the eastern shore, and is the third in importance on this side of Cuba. Water is plentiful and easily obtained.

Tides.—It is high water, full and change, at port Xagua, at 4h. 57m., and the rise is 2 feet. The stream runs at the rate of 3 miles an hour.

Xagua bank is of coral formation, 3 miles in length, east and west, and about 2 in breadth; at its north-east end there is a shoal patch with only 2 fathoms water on it. The centre of the bank lies S. $\frac{3}{4}$ W., 26 miles from Xagua lighthouse, W. $\frac{3}{4}$ S., 40 miles from Blanco cay, and about E. $\frac{1}{4}$ S., 24 miles from East Guano cay, at the east end of the Jardines bank. The northern edge of the bank is steep-to, shoaling suddenly from no bottom with 30 fathoms line to 12 fathoms, and then to 4 fathoms, which depth is near the shoal patch, making it at all times dangerous when approaching from the northward; whereas when nearing it from the southward the discoloured water will not only be seen, but the soundings will decrease gradually from 17 to 9 fathoms, which is the least depth a vessel should stand into. The bottom is hard, and not good holding ground, From the shoal patch the peak of St. Juan bears N.E.

Cochinos bay extends to the N.N.W. for 13 miles, and is about 3 miles wide. Its entrance is between Oriental point on the east, and Padre point 7 miles W.S.W. of it. The eastern shore is low and rocky, and until close to its head the water is deep, where, half a mile from the land, there are 15 fathoms, sand and rock, and the depth within that diminishes rapidly. The western shore is sandy, and the soundings

extend off only a short distance on rocky bottom. There is a landing place at the head of the bay, but the ground being foul it offers no safe anchorage.

Piedras reef and cay.— From Padre point, which is low, a coral reef extends S.E., for nearly 7 miles, where it terminates at Piedras cay, which is small and low. The reef is steep-to, and has several narrow cuts leading on to the bank, through which 3 and 4 fathoms may be carried. The best channel is just to the northward of the cay, but as nothing would be gained, it will be better always to pass outside the cay. The edge of the bank takes a W. $\frac{3}{4}$ N. direction, and 13 miles from the cay is the Lavandéras (washerwomen) shoal, which is 2 miles in length, and lies $1\frac{1}{2}$ miles southward of the east end of Blanco cay.

The shore from Padre point westward, as far as Cristoval point, a distance of 35 miles, is very low, swampy, and skirted by numerous mangrove cays. Blanco cay, the largest of these, is 10 miles long E.S.E. and W.N.W., and its west end is 15 miles from Padre point. The south shore of this cay is of sand, and at the east end water may be obtained by digging wells.

LIGHT.— On the northern part of Piedras cay, a *fixed* light is exhibited from above the keeper's dwelling, which is brown; it is 30 feet above the sea, and may be seen in clear weather 7 miles.

Cazones bay.— The shore from abreast the west end of Blanco cay recedes, forming a large bight in a N.W. by W. direction, 7 miles deep, named Cazones bay, which is shallow. The western side is formed by low mangrove cays, terminating in Diego Perez cay, 6 miles west of Blanco cay. On the northern end of Diego Perez cay there are some natural wells of good water. Fish and game are abundant.

Gulf of Cazones.— Two miles E.N.E. of the south point of Diego Perez cay, is the beginning of the north-east side of the Jardines or Jardinillos bank, which from here runs to the south-east to East rock, the most eastern danger of the bank. East rock lies about a cable from the north-east end of East Guano cay, to which it is connected by a reef. This northern edge of the bank is steep-to, rises like a wall, and has only one or two sandy patches on it above water, and though nearly always awash, often the sea does not break. It forms, with Pedras and other cays and the reefs on the north, the gulf of Cazones. This gulf is dangerous for sailing vessels, as they will be liable to calms and cross currents.

Diego Perez channel.— Between the south end of Diego Perez cay and the north end of the Jardines bank is a channel carrying 10

feet water, which leads to the bank westward and to Batabanó. There is also a small opening 4 miles S.E. of the cay, but there is nothing to mark it, and the former is more frequented. About 2 miles W.S.W. of the south point of Diego Perez cay is the south end of Flamenco cay, and thence a chain of low cays ranges in a W.N.W. direction for $12\frac{1}{2}$ miles, becoming nearly connected to the shore at Cristoval point; the water between the cays is shallow.

LIGHT.—In 1881 a light was first exhibited from a light vessel, placed south-eastward of Diego Perez cay. The light is fixed white, 43 feet above the sea, and should be seen 12 miles; the vessel is painted black with a white streak, and Diego Perez painted on her sides. Vessels entering Cazones bay should leave the light-ship on the port hand. Those proceeding to the westward should leave her on the starboard hand.

Bonito, Cacao, and Palanca cays, the most southern of this chain, are the guides for vessels through the channel, which has not more than 10 feet water, fine white sand, but there are scattered patches of rock easily seen with less than 6 feet on them. The south side of the channel is here bounded by the north extreme of the Jardines bank and the Rabihorcado cay.

Fábrica and Cristoval groups.—Palanca cay, which is rather more than $12\frac{1}{2}$ miles W.N.W. of Flamenco cay, is followed by the Fábrica group, which connect themselves with the shore to the north-east, and form a channel with the chain of the Cristoval group westward of them.

Cristoval point lies N.N.W., 6 miles from Palanca cay. From this point the low swampy coast trends nearly W.N.W. for about 20 miles to the small cay at the entrance to the little bay of Mala-hambre.

Juan Luis cays.—This part of the coast is known as the sabanas or plains of Juan Luis; and off it, at a distance of from 5 to 7 miles, is a chain of mangrove cays and sand-banks of the same name. Vessels under 9 feet draught can pass between them and the coast, and also between them and the western cays of Cristoval. About 4 miles N.W. of Mala-hambre cay is Gorda point; the intervening land is marshy, covered with a herb called *masio*, and there are some palms a short distance inland.

Broa bay.—From Gorda point the shore takes a N.N.E. and N.E. direction for a short distance, and then trends to the eastward for about 14 miles, when it bends round to the North and N.W., forming the bay of Broa, which, between Gorda and Mayabeque points, northward of

it, is 16 miles wide, and carries a depth of from 3 to 4 fathoms. The shores of this bay are submerged and covered with mangroves; at its head the river Jatibonico empties itself, and on the north shore several others run into the sea.

At 11 miles to the north-west of the river Jatibonico is the loading place of Caimito, which is much frequented. There are 13 feet water, mud, a long half mile south of the pier. At 8 miles westward of the pier is the loading place of Rosario, which has a tower and also a pier, and half a mile south of the latter there are 11 feet water, mud. Both these anchorages afford shelter at all times except in the season of the south-east winds.

Water.—At 4 miles W.S.W. of Rosario is Mayabeque point; and $1\frac{1}{2}$ miles N.W. of it is the mouth of the river Mayabeque, where there is always good water.

Batabanó.—About 9 miles westward of the river Mayabeque is the roadstead of Batabanó, which is much frequented on account of its communication with Havana by rail, but the anchorage affords no great security against south-east winds. The passages, however, leading to this anchorage are so shallow and intricate, as to be only navigable by vessels not drawing more than 12 or 13 feet water. On the shore there is a fort and a small village between the mangroves, and 3 miles inland is the town of Batabanó, which acquires more importance every day, as it is the point of communication between Havana and the whole southern coast of Cuba. The time from this town to Havana by rail is 2 hours, and steam vessels run along the coast east and west several times a week.

LIGHT.—A *fixed* white light is exhibited from a small lantern on a mast, 31 feet high, on the end of a pier at Batabanó, and may be seen 3 miles.

Cayamas point.—From Batabanó the coast runs westward for 15 miles to Cayamas point; between are Cagio point and river, where the vessels at Batabanó often obtain water. This river empties itself through the marshes, and the anchorage off it, with $2\frac{1}{4}$ and $2\frac{3}{4}$ fathoms water, is sheltered from all winds by the chain of cays in front of it. The marshy ground from the mouth of the river to the firm land is more extensive than that between Batabanó and Mayabeque, yet its environs are more cultivated.

Batabanó channels.—Cayamas point forms with the chain of cays southward of it the channel of the same name, in which there are only $6\frac{1}{2}$ feet water. These cays run in a S.S.E. direction for 11 miles, where they form, with another chain extending 13 miles eastward, the

channel of Hacha, with $7\frac{1}{2}$ feet water in it, which is much frequented by small vessels leaving Batabanó or proceeding to it westward of the isle of Pines and San Felipe cays.

Cruz cay, the eastern of the latter chain, lies nearly S. by E. $\frac{1}{4}$ E., 15 miles from Batabanó, and at a little distance westward of it is Redondo cay, under the lee of which small vessels find shelter from the strong south-east winds, from July until October, to which the whole coast is exposed.

At 6 miles southward of Cruz cay is Monte-Rey cay, forming a channel between with $2\frac{1}{2}$ fathoms water, mud bottom. This channel is the widest of these which afford a passage to vessels to or from Caimito, Rosario, and Batabanó. From Monte-Rey a ridge of rocks extends to the south-west for 8 miles. When westward of this reef, the several heads of rocks southward of the cays on the north side of the channel should be avoided.

Directions to Batabanó.—If bound to Batabanó through the gulf of Cazones, steer up the gulf so as to make Diego Perez cay on the port bow. Skirt the reef until the south part of this cay bears about W. by N., when a vessel may haul round the dry point of the reef and steer for the south part of the cay, and with a good look-out she will not have less than 10 feet water. Give the end of Diego Perez cay a berth of about three-quarters of a mile, leaving the light-ship on the starboard hand, and the water will deepen to 2 and 3 fathoms, but with an irregular bottom and rocks in all directions. When abreast of Diego Perez steer to pass 3 cables from Flamenco cay; a greater distance off is unsafe.

After passing Flamenco cay, steer to pass midway between Rabihorcado cay on the port bow, and Bonito cay and the rest of the range of cays on the starboard. A depth of 3 and 4 fathoms will be carried on this course, but when abreast of Rabihorcado the water will rapidly shoal to 9 feet, over a white sandy bottom and occasional patches of rock, which are easily distinguished. The latter depth will be carried for about 12 miles, on a West or W. $\frac{1}{2}$ N. course, when it will gradually deepen to $2\frac{1}{2}$ and 3 fathoms, with the same white bottom and patches of rocks.

Gordas channel.—In a vessel of not more than 8 feet draught, this channel may be advantageously taken, in preference to going round the rocky spit which projects 7 or 8 miles to the southward from Monte-Rey cay. To enter this channel, when the south end of Ambar cay on the north-west side of the channel bears N.W., distant three-quarters of a mile, steer about N.N.E., keeping Ambar cay about half a mile on the

port hand, and taking the precaution of having a boat sounding ahead, so as not to come into a less depth than 9 feet, soft mud.

The water will soon deepen to 2 and $2\frac{1}{2}$ fathoms, and a course can be shaped for Batabanó. Give Cruz cay a wide berth in passing, as the depths near it are not known. There are no dangers between Gorda point and Batabanó, but regular soundings of $2\frac{1}{2}$ and 3 fathoms; the distance, however, 19 miles, appears to be over represented on the charts, and at night not more than 12 miles should be allowed as the run between.

Towards Batabanó the soundings will decrease slowly and regularly. The anchorage is open to the southward, and may be recognized by a pier projecting about 2 cables from the mangrove shore. At a cable from the pier head the depth is 10 feet.

Hacha channel.—Bound to Batabanó from the westward of the isle of Pines, from a position 2 miles westward of Dios cay, in $2\frac{1}{2}$ fathoms water, steer N.E. by N., carrying about 3 fathoms, until the Guanima cays are sighted, which, with all the cays in their locality, are so exceedingly low as often to cause great perplexity. When these cays are made out, the water will shoal to $2\frac{1}{2}$ fathoms, when steer E.N.E. until 2 or 3 miles northward of the Petatillos bank, which runs east and west. Run along this shoal at that distance, carrying $2\frac{1}{2}$ and 3 fathoms, until Culebra cay bears S.W. by S., when the Hacha channel will open out, bearing N.E. by N.

Steer directly for the passage, and in running through take care to avoid the mud bank on its eastern side; navigate it with a boat ahead, keeping nearer the western shore than the eastern, and 9 feet will be carried over soft mud. When clear of the channel, a course can be shaped for Batabanó.

Majana bay and Sabana-la-mar.—From Cayamas point the shore takes a W. by N. direction for 9 miles, when it trends to the south-west for 8 miles to point Salinas, forming Majana bay. The river Guanima empties itself westward of Cayamas point, and about here the marshes terminate. From Salinas point the coast trends S.W. 6 miles to Capitana point, and then about S.S.W. 4 miles to the small creek of Sabana-la-mar, which affords shelter to droghers, near the mouth of the Cristoval river.

The coast from the entrance to Sabana-la-mar runs nearly S.W. by W. for 6 miles, to the entrance of the river Rancho, and then S. by W. 11 miles to Carraguco point; in this space are the creeks or inlets of Guasimal, Bacunagua, and others of little importance; off this part of the coast, shoal water extends for nearly 7 miles. About 6 miles

west of Carraguco point is the entrance to the river San Diego, and 4 miles S.S.W. of the latter is Gato point, near which the rivers Convento and Hondo join the sea, forming inlets. About 5 miles S.W. of Gato point is Gaspar point, and 8 miles farther is Fisga point, off which a shoal of $3\frac{1}{2}$ fathoms extends southward about 3 miles.

Calonna point and river.—From Fisga point the marshy shore trends W.N.W. 4 miles to Calonna point, and then about N.W. 4 miles, forming a bay, at the head of which the river Calonna empties itself.

From the former point a reef skirts the shore, the southern edge of which is $1\frac{1}{2}$ miles off Calonna point, 2 miles westward it forms a channel $1\frac{1}{4}$ fathoms deep, by which the mouth of the Calonna is reached, one of the loading places of Pinár del Rio. From the Calonna river the coast runs about S.S.W. 4 miles, and then W. by S. $\frac{1}{2}$ S. 4 more to St. Domingo point, and thence west 9 miles to the mouth of the river Galafre.

Cortes bay.—From the mouth of the Galafre, the coast trends S.S.W. 7 miles to the entrance of the river Cuyaguategu. About 4 miles southward of the latter are four small cays, which extend $2\frac{1}{2}$ miles in a southerly direction, covering the mouth of a deep bay, called the laguna de Cortés. In this lagoon there are $2\frac{1}{2}$ fathoms water, but at the narrow entrances formed by the cays there are only 6 feet. Turtle are found on the cays, and on them are fishermen's huts. Piedras point, which is on the parallel of San Felipe cays and distant from them about 19 miles, is the termination of Cortes bay, where there are from 3 to $3\frac{3}{4}$ fathoms water over weeds.

Mangle point.—A rocky ledge extends off Piedras point for some distance, having 15 feet water on it, and near the point are some rocks on which the sea breaks; at $2\frac{1}{2}$ miles S.S.E. $\frac{1}{2}$ E. of the point the depths increase to 5 fathoms, rocky bottom. From Piedras point, the coast, bordered by a bank, trends S. by W. $\frac{1}{2}$ W. for 8 miles, to cape Frances, and thence S.W. by W., 5 miles to Mangle point. This point is low, and there is nothing to mark it except the bend of the coast, and a fisherman's hut west of it on a small sandy beach. It is skirted by a reef which extends off 2 cables, and is steep-to.

The description of the main coast of Cuba is continued at page 415.

Gulf of Batabanó.—The large bight or indentation of the land between Padre point on the east and Mangles point on the west, is fronted by the Jardines bank, the isle of Pines, the Indian and San Felipe cays. There are several channels which lead into the gulf; the one on the east at the north extreme of Jardines bank, Recsario channel on the south, the passage west of Frances point on the south-west, that between the

Indian and San Felipe cays, and lastly, between Piedras point and Cucaña bank on the west.

As the coast of Cuba, as well as several of the inner cays, have been mentioned in describing the channels they form, leading to Batabanó, the description of the other cays is proceeded with.

Jardines or Jardinillos bank.—The north-east part of the reef which encircles the great bank and cays of the Jardines, commences $1\frac{1}{2}$ miles eastward of Diego Perez cay, and running to the south-east forms an inward curve at the Médano Vizcaino cay, and thence continues to the eastern cay of the bank; this side of the bank is steep-to, studded with rocks and small patches of sand just awash, with no opening. The mariner is again warned that the current in the gulf of Cazones is uncertain, both in strength and direction, and he cannot be too cautious.

East Guano cay is of soboruco, about 40 feet high, the east end covered with grass, dwarf cactus, and shrubs; elsewhere the ground is rough with deep pits from the excavations for guano. In 1863 there were three long store sheds and five dwelling-houses on it. A small rock lies about a cable from the east end of the cay, and shallow uneven ground extends half a mile E.N.E. of it. The bank, about 5 miles in breadth, extends in an E.S.E. direction from the cay, and terminates about 11 miles from it, where there are 14 fathoms water. From this depth the soundings gradually decrease towards the cay, with a bottom of coral, sand, and weed. There are a few birds on the cay, chiefly kittiwakes and boobies.

From East Guano cay, which lies S. $\frac{1}{2}$ E. 18 miles from Piedras cay, and S.W. $\frac{1}{4}$ W. 37 miles from Xagua lighthouse, the edge of the Jardines bank runs to the westward for 12 miles to Trabuco cay. Thence the cays continue to Largo cay, 13 miles to the westward, and are generally of rock, high and steep, and lie near the edge of the bank, which is skirted by a chain of reefs.

Largo cay, 12 miles in length S.W. by W. and N.E. by E., is the most eastern of the Jardines, which name comprises all the cays between it and isle of Pines. Its south-west point lies about W. by S., 28 miles from East Guano cay; it is uniform, about 50 feet high, thickly wooded, and on its south side is a sandy shore, bordered by a reef which at its east end extends more than a mile off. About 5 miles S. by W. from the north-east point, and 6 miles E. by N. $\frac{1}{2}$ N. from the south-west point, lies a dangerous reef about 3 miles from the shore, and just within the edge of the bank, on which the sea breaks. The reef which skirts the south side of this cay runs about W. by S. for 12 miles, and then trends to the southward for about 6 miles, forming a spit nearly 2 miles wide, at the outer extreme of which is supposed to lie Jack Taylor shoal. From the

northern end of the spit, the main reef continues to the westward for 5 miles, as far as Rosario channel, with deep water close to the southward of it.

On the above reef are the two small rocky Ballenatos cays, barren, white, and about the same height. They are about 3 miles apart, and the eastern one lies about a mile from the west end of Largo cay. There is said to be anchorage in 7 to 10 fathoms water northward of them.

Between East Guano cay and Rosario channel, the bank does not extend more than between one and 2 miles southward of the cays (except at the Jack Taylor spit), with 16 to 13 fathoms water, rocky bottom, and the soundings diminish rapidly to the reef.

Jack Taylor reef.—Several positions have been assigned to this dangerous shoal, but over which H.M. ships have sought for it in vain, and found deep water. Commander H.D. Grant, of H.M.S. *Steady*, in April 1863, went in search of this reef. Having accurately ascertained the vessel's position at noon, breakers were reported ahead at 4h. 30m. p.m. and the vessel afterwards hove to one mile south of them; from $12\frac{1}{2}$ fathoms water, coral and sand, the soundings decreased regularly to the reef, which is of coral, and at the time the remains of a wreck was lying on it. From the mast-head the white water was seen running in like a spit until it joined the main bank. The Cayman fishermen say there are 5 and 6 fathoms water all over this spit. The longitude by chronometer was ascertained on the spot, and the latitude brought forward from noon; the latter was $21^{\circ} 28' N.$, and the longitude $81^{\circ} 47' 30'' W.$

Rosario cay, when first seen from the southward, has the appearance of three small islands, the largest being in the centre. As it is approached some sand cliffs will be observed, by which it will be known from those in the immediate neighbourhood. The shore of Largo cay on the east, and that of Cantiles cays to the west, are wooded.

Rosario channel.—Between the west end of Rosario cay and Cantiles cay there is a channel through the reefs; but at its inner end to the westward of the Passage cays, there are only 9 feet water. The opening in the reef leading into this channel lies southward of the west end of Rosario, and is a third of a mile wide. It is steep at the sides, and in the middle the depth is 3 fathoms; half a mile from the north point there is a rock which shows above water.

Tides.—The rise of tide in Rosario channel is about 2 or 3 feet, but the periods are uncertain, and chiefly dependent on the strength of the wind.

Dry Shingle.*—From the Rosario channel, the edge of the bank runs about S.W. for 16 or 18 miles, and just within it a formidable barrier coral reef extends to within 3 or 4 miles of the Dry Shingle, the most southern danger. From the Dry Shingle the bank trends in a N.W. and West direction until near the east end of isle of Pines; but this part of the bank should be approached with very great caution, for although the Cayman fishermen say that it is clear of danger, its limits are uncertain. On the bank there are numerous small islets, cays, and reefs.

Commander Grant says, "We anchored in white water, 5 fathoms, sand, with the Dry Shingle S. 59° E. (true) distant one mile. Over the small portion we navigated, we had 7, 8, and 9 fathoms water, sand and weed; and 4 and $4\frac{1}{2}$ fathoms was carried for 2 miles towards the Calapatch reef. The Calapatch Mehagan is one mass of coral just awash, and many vessels have been wrecked on it. The reef is in lat. $21^{\circ} 26' 50''$ N., long. $82^{\circ} 10' 36''$ W. There are soundings about a mile outside the shingle, in from 5 to 14 fathoms.

Caution.—In leaving the Rosario channel, do not steer to the westward of S.S.W. until a good offing is gained, especially if the weather be cloudy, and observe that the cays to the westward of Rosario are lower than Largo cay.

Water.—It is said that good water may be found by digging wells on any of these cays. The fishermen resort to Rosario cay for this purpose and for the cabbage palm, which grows in great abundance on these islets.

Cocoa Plum cay lies eastward of the east end of isle of Pines, and the line of white shallow water between is very distinct. The anchorage under the cay is sheltered by a reef to the eastward, and by the adjacent cays westward. The eye is the guide through the white water, as there are no marks. The *Petrel* anchored in $4\frac{3}{4}$ fathoms water, with the west end of Cocoa plum cay bearing North, west extreme of Watch cay W. $\frac{3}{4}$ N., centre of Rum cay N.N.W. $\frac{3}{4}$ W., and the south extreme of the reef S. by W.; and remained for three days during a northerly gale.†

Isle of Pines.—The main body of this island is somewhat circular, with a diameter of 25 miles, but from the south-west end a tongue of land extends about 17 miles to the north-west. The southern half is low and swampy, and nearly disconnected from the northern part near the centre by marshy ground, which is impassable during the rainy season.

* The German bark *Amalia* in 1882 struck on a reef said to lie S. by E. $\frac{1}{2}$ E., 9 to 10 miles from cay Avala; but as this cay is not named on our charts, the position of the shoal cannot be given; it is possible that Dry Shingle Reef may extend further South.

† Mr. John Richards, Master, H.M.S. *Petrel*, January, 1864. None of these cays can be recognized on Admiralty charts.

The northern part is lofty and in some places mountainous; several streams descend from the heights and through lagoons navigable for small vessels, drawing 8 or 9 feet, for a considerable distance. The island is thickly wooded, and produces pine trees fit for masts or spars of large dimensions. In making it from the southward three remarkable mountains are first seen; the Dolphin head or mount José, the westernmost and loftiest, appears from this position a distinct peak, but from the westward it forms three peaks, and may be seen 45 miles. The capital of the island is called Nueva Gerona. The inhabitants live mostly in the north part, and amount to about 800 persons, principally occupied in rearing cattle.

South and West Coasts.—From Piedra point, the southern shore, which is of sand, runs about S.W. by W., 25 miles to the western end of the Larga beach; sand-banks extend off the western portion of this coast. The Larga beach is all along skirted by a reef for from a half to three-quarters of a mile, and the bank extends about one-third of a mile beyond it. Off the east end of this beach there is a small opening in the reef with sufficient depth for coasters, which find good shelter within.

From the western end of the Larga beach, the coast, which is composed of soboruco rock or low white cliffs of bleached honeycombed coral and indurated sand, runs a little northward of west for 9 miles to cape Pepe,* the south-west extreme of the island; thence it trends N.N.W. about 2 miles to Cocodrilo bay, where fishing vessels generally take shelter. Perdenales point lies about N.W. by N. $7\frac{1}{2}$ miles from Cocodrilo bay, and is foul to the distance of one third of a mile. All this part of the coast is steep-to, and deep water will be obtained within a quarter of a mile of the reef which closely skirts it.

Port Francés.†—From Perdenales point the coast trends about N.N.W. $\frac{1}{2}$ W. 3 miles to Francés point, the most western of the island, forming a bay called port Francés. This bay is convenient for vessels stationed on the south coast of Cuba, affording good shelter during the strong trade wind. The anchorage is good all over the bay by selecting the white spots, as the water is very clear. The most convenient for getting under way is with the following bearings:—Perdenales point S.S.E.; north-west extreme of Bush cay N.W. $\frac{3}{4}$ N; and Small cay E. by S. $\frac{1}{4}$ S. A sandbank skirted by a coral reef, and very shallow, borders the north shore, and extends some distance round Bush cay.

* It is proposed to establish a *revolving* light of the second order on this cape.

† See plan:—Port Francés, scale, $m = 1.3$ inches, on Admiralty chart, No. 2,579, Western portion of Cuba.

There is good fishing with the seine on the north shore; spiny lobsters abound, and rays and alligators frequent the boat channels.

Water.—About a cable from the east end of the longest beach there are some wells of good water; but the ground being rocky the casks will have to be filled in the boat, or, if on the beach, rafted. There is good fishing in the bay, and wild cattle frequent the wells at noon and in the evening.

Siguanea bay.—From Bush cay a ridge of rocks extends off three-quarters of a mile to the edge of the bank, and at the same distance N.N.E. of the cay lies a dangerous patch with only 6 feet water on it. The cay is separated from the point by a small boat channel, carrying 8 feet water, leading into Siguanea bay. The shore from Francés point turns abruptly to the south-east for 15 miles, and is skirted by low mangrove cays; it then bends round to the N.N.E. for 7 miles to a point, forming the inlet, in which there is excellent anchorage for vessels of light draught. A bar, however, about a mile in breadth, runs right across from Francés point to the south end of the Indian cays, and has only 16 feet water on it. The depth increases within the bar to $3\frac{1}{2}$ and 6 fathoms, and then gradually decreases towards the shore.

The edge of the bank lies about $1\frac{1}{2}$ miles outside this bar, and is so steep that the first cast near the cays may be 3 fathoms; the depth gradually decreases, and a vessel may work in by the lead and come to in any part of the bight. The deepest part of the bar is about 4 miles south-west of the Indian cays.

“A vessel of light draught may haul into Siguanea bay, when about 2 miles to the northward of Francés point. The depths are 5 and 6 fathoms in the middle of the bight, gradually shoaling towards the shore. There are no dangers, and the holding ground is excellent.”*

Water.—There is a watering place in Siguanea bay, a little to the southward of the Water hills, the first elevated land from the head of the bight; but the casks must be rolled about 150 yards. There are also two good springs at the foot of the Siguanea hills, where water may be obtained at a little distance from the shore.

Tides.—The rise of tide in the bay is about 6 inches, but after a strong Norther it is only 3 inches, or less.

Indian river.—The entrance to this river lies N. by W. $5\frac{1}{2}$ miles from the eastern point of Siguanea bay, in about lat. $21^{\circ} 41' N.$, long, $83^{\circ} 0' 0'' W.$ Good anchorage, exposed only to the westward, will be found in $2\frac{1}{2}$ fathoms water, about a mile off shore.

* Lieut. J. Murray, R.N., commanding H.M. gunboat *Skipjack*, 1858.

A mud bar is formed across, making it difficult for even light boats to get in, except at high water; but having crossed the bar from one to 3 fathoms will be carried for 4 miles up. About $2\frac{1}{2}$ miles within the entrance, the mangrove swamps merge into the pine country, and a little higher up strong and serviceable spars may be cut of any size under a frigate's topmast, so as to fall into the river. When green they generally sink, but they quickly dry and become much lighter. Pigeons, raccoons, and crocodiles are found in abundance, and great numbers of hogs run wild through the woods.

The coast from the Indian river runs about N.N.W. 8 miles to Indian point, which lies N.E. $\frac{3}{4}$ N. 14 miles from Bush cay. From Indian point the shore takes a N.N.E. direction 9 miles to Barcos point, the north-west extreme of the island, which is low, and forms the north side of a shallow bay called Barcos bight. Thence it trends about East, $11\frac{1}{2}$ miles to the mouth of the river Casas, which is the loading place of Nueva Gerona, and has the greatest trade with Cuba.

The river Casas is navigable for boats to some distance. It is fed by numerous rivulets, and about 4 miles up, the water becomes fit for use. On its left bank the Casas range rises to a considerable elevation, and on the high lands are some small settlements where cattle and pigs may be procured, but vegetables are scarce.

Mount Diablo.—From the mouth of the Casas, the coast runs E. by N. about 4 miles to a small peninsula named mount Diablo. Between, there is a ridge of hills of moderate height called mount Cavallo, and the coast is here more firm and free of swamps. From mount Diablo, eastward of which there is a small islet, the shore trends south-eastward 7 miles to the river Santa Fé. From Salinas point $5\frac{1}{2}$ miles south-eastward of mount Diablo, the shore to the southward is skirted by a reef.

River Santa Fé.—This stream is navigable for small vessels of light draught for some miles, and for boats to the village on the right bank. The water is good for drinking. About 3 miles up, a branch turns off to the south-west called the Mal-pais, which is also deep enough for small craft and for boats to a considerable distance. The arm terminates in an extensive lagoon.

East coast.—From the mouth of the Santa Fé the eastern shore bends round to the south-east and south, forming the east side of the island, which is low and swampy. To the eastward of the river, the shore is fronted by a chain of low mangrove cays which curve round to the north-west on the north side of the island, and terminates at Pipa cay about N.E. by N. 18 miles from Barcos point. Between them and the north shore of the island, there is a depth of $2\frac{1}{2}$ and $3\frac{1}{2}$ fathoms, over mud and

weed, which may be carried up to mount Diablo ; but thence to the east ward it gradually becomes shoaler, and off the mouth of the Santr Fé there are only 9 feet. The holding ground is excellent ; but on account of the bar between the Indian cays and Francés point, which is the way in, it is inaccessible to vessels drawing over 16 feet.

Tides.—It is high water, full and change, on the north side of the isle of Pines, at 6h. Om., and the rise is 3 feet.

Mangles islets.—This chain of islets and cays, composed of several groups, under the names of Ingleses, Rabihorcado, Alcatraces, Pipa, &c., is known as the Mangles group. They are surrounded by shallow water, which extends some distance from them. From Pipa cay the islets trend in a S.E. by E. direction for about 20 miles, and terminate at the English cays, which form the north-west side of the channel of the same name. On the south side of this passage, another chain of islets extends to the southward, joining the island near Corral point, the eastern extreme.

A sand-bank surrounds the latter cays at the distance of a mile, connects itself with the great bank eastward of the isle of Pines, and trending in that direction 18 miles as far as Tablones cay, thence runs E.S.E. 11 miles to Cantiles cay, on the west side of Rosario channel. To the north of Cantiles cay, but on the eastern side of the channel are the Passage cays ; thence the edge of the Jardines runs northward and north-east to Traviesa and Rabihorcado cays, forming two indentations separated by the former, and then trending with a southerly curve to the reefs at the north-east extremity of the Jardines, eastward of Diego Perez cay.

Flamenco and Culebra channels.—About 5 miles southward of Calavera cay, the western of the two forming Hacha channel, lies Flamenco cay, and a mile westward of the latter is Culebra cay. Between the reefs extending in all directions from these two last cays, is a passage with $1\frac{1}{4}$ fathoms water. Between Flamenco cay and those north-east of it, there is a channel carrying $1\frac{3}{4}$ fathoms ; but care should be taken to guard against the reefs which run 3 miles to the southward and westward nearly to the meridian of Flamenco cay. Between Culebra cay and the Petatillos banks there is another channel with $1\frac{3}{4}$ fathoms.

The Petatillos are two (fifteen by chart) banks, equal in form and extent, which rise above water, and are separated by a passage carrying $2\frac{1}{4}$ fathoms water. Over the greater part the bottom is white, but the lead should be carefully attended. These banks begin about 4 miles south-westward of Culebra cay, and extend 14 miles W. by S., with a breadth of about 2 miles.

Laguna and Hambre cays.—About 12 miles S.W. of Culebra cay lies the most northern of the Laguna cays, which together with those

of the Hambre group, extend about S. by W., 6 miles. This chain of islets is encircled by a reef which also surrounds the Petatillos and Culebra cay. Between the Laguna cays and Petatillos banks there is said to be a passage with $2\frac{1}{4}$ and $2\frac{3}{4}$ fathoms water, which facilitates the communication with Hacha channel, and the passage between Cruz and Monte-Rey cays.

About $4\frac{1}{2}$ miles S.W. by S. from the most southern of the Hambre cays is Pipa cay, and the channel between carries about 2 fathoms water.

Dios cay.—Nearly 18 miles W.S.W. of Pipa cay is Dios cay, small, low, and surrounded by reefs which extend to the north-east for 10 miles, where there is a channel a mile wide, and nearly a fathom deep; thence the reef continues eastward for 8 miles to Pipa cay, and borders the south side of the Mangles group at $2\frac{1}{2}$ and 3 miles off, as far as English channel; on the northern side of the group the reefs are about a mile off. Between Dios cay and Carraguco point is the passage for vessels which trade with Batabanó. There are also said to be channels with $2\frac{3}{4}$ and $3\frac{3}{4}$ fathoms water, between the Dios and Indian cays, and between the Dios and San Felipe cays.

Indian cays form a group 7 miles in extent N.N.W. and S.S.E.; they are low, covered with trees, and separated by small channels. The most northern of the group lies in about lat. $21^{\circ} 52' N.$, and S. by W. 13 miles from Dios cay; and the southern N. by E. $\frac{1}{2}$ E. $9\frac{1}{4}$ miles from Bush cay (off Francés point), and S.W. by W. 6 miles from Indian point. In the channel between them and the latter point, there are nearly 3 fathoms water, over mud and weed, which it is said may be carried up to Dios cay. These cays are surrounded by reefs, which from the south part extend 2 miles to the southward; and from the northern, 2 miles north-westward.

San Felipe cays* form a chain 13 miles in extent east and west, and are low, marshy, and covered with mangroves. They lie 11 miles southward of Fisga point, with the eastern extreme N.W. $8\frac{1}{2}$ miles from the most northern of the Indian cays. San Felipe cays, like the former, are bordered by reefs, which run north-westward 6 miles, to Cucaña bank, which has 8 feet water on it, and lies S.W. 13 miles from Fisga point. Between the reef extending 5 miles westward of Cucaña bank and the coast of Cuba, the channel is about 8 miles in breadth and $1\frac{3}{4}$ to $2\frac{1}{2}$ fathoms deep; there is also a one-fathom patch northward of this west extreme of the reef, and midway between it and the shore.

The bank between San Felipe cays and cape Francés is steep-to, but close within its edge it shoals very quickly, and there are patches of only

* It is reported that the west end of San Felipe cays is in long. $83^{\circ} 37' W.$, or 5 miles westward of the position on Admiralty chart.—H.M.S. *Landrail*, 1862.

1½ fathoms water, about 8 miles north-eastward of the cape. The bottom is of sand and weeds, but in places not visible. There is a well of good water near the beach, on the south side of the most eastern of San Felipe cays, and in the vicinity of all of them turtle and fish abound.

Tide.—The rise of tide at San Felipe cays is about 2½ feet; but it is irregular. The high tide appears to take place in the morning, and the low tide at night. The flood stream runs to the north-east with much strength.

The Coast of Cuba from Mangle point, page 406, takes a W.S.W. direction to cape Corrientes; the land is low, thickly wooded, and the shore is chiefly formed of soboruco or white indurated sand cliffs from 10 to 20 feet high, steep-to. About 4½ miles eastward of the cape, moderate depths may be obtained about half a mile from the shore.

Cape Corrientes is a low sandy point, with the ruins of a stone wall a short distance within it, at the edge of the low trees which cover the land in the interior. There are a few small dry rocks about 50 yards from the point, and a shallow rocky spit runs off a quarter of a mile S.W. of them. Two-thirds of a mile off shore the depth is 5 fathoms. This point has been mistaken by strangers for cape San Antonio, from the land of Cuba appearing to terminate here, on account of the deep bight of Corrientes westward of it; but the lighthouse on cape San Antonio clearly marks the distinction; besides, as Corrientes is approached, should the weather be clear, the distant mountain ranges of Organos and Rosario may be seen to the northward.*

Anchorage.—There is good temporary anchorage in 9 fathoms water, with cape Corrientes bearing E. by N. about 1½ miles.

Corrientes bay.—About 3 miles northward of cape Corrientes there is a remarkable rocky cliff called Cayman bluff. Thence the shore trends northerly, curving eastward, for 7 miles, and then turns abruptly to the westward. The bluff is of soboruco, steep, and higher than any other part of the coast of the bay; to the northward of the cliff a small vessel may anchor in 5 fathoms water, close to the sandy beach, by carrying a hawser to the shore. This is the only anchoring place in the bay which

* Commander H. D. Grant, H.M.S. *Steady*, says, "that at noon on the 20th Dec. 1862 we were nearly 9 miles due south of cape Corrientes, and by the chart only 2 miles off shore, so I think its position on the chart is 7 miles too far south. But it would be unsafe to assume that the whole of the land from the cape to Mangle point is 7 miles too far south, as about Fraile point the land seemed to project considerably to the south."

affords shelter from the strong south-east winds. Elsewhere there is no bank, the shore is low, steep, and covered with trees.

At the head of the bay, about 6 yards from the shore, there is a spring of fresh water, which rises in bubbles to the surface of the sea. Ten miles W.S.W. of the head of the bight, is a remarkable piece of scarped land forming a cliff of soboruco at a short distance from the beach, called Balcones;* thence the shore trends S.W. 8 miles to Holandés point.

Holandés point lies W. $\frac{1}{2}$ N. 15 miles from cape Corrientes, and is the western extremity of the bay of the latter name; the water is discoloured for about a mile off the point. For 3 miles on either side of the point, the shore is bounded by a rocky cliff about 35 feet high, and at the extremity of the point there is a remarkable red spot. From the east end of the cliff, a reef extends off shore about $1\frac{1}{2}$ cables as far as this red spot, and the depths are from 14 to 20 fathoms half a mile outside it. From Holandés point the coast trends about W. $\frac{1}{2}$ N. 7 miles to Perpetua point; between is Piedras point, off which a reef extends about 3 cables. Perpetua point lies about 3 miles S.E. by S. from cape San Antonio, and on it is a fisherman's hut.

Tides.—It is high water, full and change, at the west end of Cuba at 9h. 30m., and the rise is generally about $1\frac{1}{2}$ feet. The flood sets to the northward, the ebb to the southward, at the rate of about half a knot; but there is frequently no stream at all, or a strong current to the south-east.

Current.—The current on the south side of Cuba is variable, and generally very strong. Its usual course is to the westward, and between the Grand Cayman and cape San Antonio it sets to the north-west. It is, however, frequently found setting in an opposite direction, and appears to be greatly influenced by the force of the prevailing trade wind. An easterly stream is generally felt after a prevalence of light winds, and more particularly during, and for a short time after, a north wind in the winter season. Sometimes, however, on such occasions, it will only extend to about 20 miles off shore. Some observations tend to show that an easterly set is more frequently found during the increase of the moon, as, before stated (page 356), and this is the opinion of the Cayman fishermen, who are constantly passing to and fro from their island to the Jardines, Jamaica, and the Mosquito shore.

* The wreck of the "*Royal Charlie*," a full-rigged vessel, lies $3\frac{1}{2}$ miles inside Holandés point and about $1\frac{1}{2}$ miles from the remarkable Balcones cliffs, the wreck lies right up against the land, which is very steep-to, there being no bottom at 20 fathoms. 2 cables off shore abreast of her, the whole Western shore of Corrientes bay was strewn with wreckage deposited there by currents probably the indraft of the usual Westerly set.—Navigating Officer, H.M.S. *Flamingo*, 1881.

Hence, with so much uncertainty, the greatest attention is necessary in navigating on this side of the island, especially in the neighbourhood of the isle of Pines and the Jardines, which are so imperfectly known, and where the stream is also frequently found to set strong towards the cays and reefs, and the lead is of but little use. In running between Jamaica and the Grand Cayman, and from thence between cape Catoche and cape San Antonio, the reckoning cannot be too frequently checked. In beating up from cape San Antonio, a vessel may obtain some assistance from the land-wind, but in the winter season it does not extend far from the shore and is very uncertain.

In the space between the Jardines and the cays of Doce Leguas, there is generally no current whatever; but between Breton cay and Caballones channel, it runs $1\frac{1}{2}$ miles an hour to the westward.

Winds.—When the wind has not been blowing with great force, off the south coast of Cuba, it generally has a rotary movement following the diurnal motion of the sun. The wind in the evening begins to blow from the northward off the land, and by daybreak veers to N.E., at 8 a.m. to E.N.E., at noon to E.S.E., at 2 p.m. to South, at 4 p.m. to S.W., in which quarter it continues until it falls calm, and is succeeded by the land-wind. With this knowledge, a vessel may get considerably to the eastward from May to August, when calms and light winds prevail, and on other occasions during changeable winds, especially at night.

The greatest difficulties in getting to windward exist between Breton cay and the Caballones channel, where the current runs strong to the westward; but after passing East channel, there will be no difficulty in reaching cape Cruz. To the eastward of the cape it is useless to work to windward near the coast, but from it a vessel will probably reach Falmouth or St. Ann bay on the north coast of Jamaica.

CHAPTER IX.

GREATER ANTILLES.—NORTH COAST OF CUBA, AND OLD
BAHAMA CHANNEL.

VARIATION IN 1887.

Havana - - -	- 3° 40' E.		Paredon Grande cay -	2° 25' E.
Cruz de Padre cay -	3° 10' E.		Lucrecia point -	1° 50' E.

THIS chapter contains a description of the north coast of Cuba, from cape San Antonio, the west extreme of the island, to Havana; and from cape Maysi, its east extreme, to the same port, including the Old Bahama channel.

CAPE SAN ANTONIO,* the west end of Cuba, is low, covered with trees from 70 to 80 feet high, which are seen before the land, and often appear like vessels under sail; the shore is intersected alternately by soboruco cliffs and sandy beaches. The extreme end of the island bends round so gradually for about 4 miles, that it is difficult to make out any projecting point; so that the cape can only be recognized by some huts, a flagstaff, and the lighthouse on the sandy beach; the lighthouse is coloured white with a black top, and has the word Roncali painted on it. Near Perpetua point a bank commences, which sweeps round the west end of the island about a mile off shore, and joins the Colorados reef to the northward of the cape. On the edge of the bank there are from 18 to 23 fathoms water, rocky bottom.

LIGHT.—The lighthouse on cape San Antonio is 107 feet high, and exhibits 117 feet above the sea a *white light revolving every half minute*. A boat can easily land under the lighthouse at a small breakwater extending from the sandy beach.

Anchorage.—Temporary anchorage, in about 9 fathoms, will be found under the west end of Cuba, with the south extreme of the land bearing S.E, and the north extreme N.N.E. It must be approached,

* See Admiralty chart:—Cuba, Western portion, No. 2,579; scale, $m = 0.12$ of an inch.

however, under easy sail, and care must be taken not to shoot too far in, as it shoals suddenly and the bottom is very foul.

Antonio Knol* is a coral bank, about $2\frac{1}{2}$ miles in length and two miles broad, with a general depth of 14 and 16 fathoms, with the exception of one spot on which only 10 fathoms were found. It lies N.N.W. $\frac{1}{2}$ W. about 9 miles from cape San Antonio, and its centre is 4 miles from the edge of the Colorados bank; discoloured water may be seen over it in clear weather. About $1\frac{1}{2}$ miles N.E. of the centre of the knoll is another patch of 10 fathoms.

The Coast forming the headland of cape San Antonio runs in a N.N.E. direction $4\frac{1}{2}$ miles to Cajon point, its north extreme. All this part is low with a sandy beach; in front of it the bottom is rock and sand, and a vessel if necessary may anchor for shelter, but as the bank is so narrow and shallow, especially southward of the lighthouse, caution will be necessary in choosing a berth. About a mile N. by W. of Cajon point, is a sandbank about half a mile in extent, with rather less than one fathom water on it. From Cajon point the shore trends S.E. $\frac{1}{2}$ E. 3 miles, and then N.E. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles to a point southward of Leña cays, forming a bight; thence nearly in the same direction 6 miles farther to Guanah point, $3\frac{1}{3}$ miles beyond which is Caravela Chica point. The shore continues low, and clear of danger, with the exception of the Leña cays and Cajon point, which are a little higher than the intermediate coast.

As the coast and cays inside the Colorados reefs will hereafter be described, it will be sufficient now to say that the former trends from Cajon point in a general E.N.E. direction for 35 miles to the entrance of Guadiana bay, and from the north point of the bay N.W. by N. 11 miles to Avalo point, thus forming a deep bight; it then curves gradually round to the N.E., for 85 miles to Bahia Honda. On about the meridian of 84° , the land becomes lofty, and forms a conspicuous mass of hills called the Cockscorn mountains or Sierras de Acosta, in which there is a remarkable notch that may be used as a good point of departure. About 12 miles south-west of Bahia Honda is Saddle hill or Guajaibon penk, 2,532 feet high, which may be readily recognized by the form of its summit, and is also a good guide when beating up.

•**Colorados Reefs.**—This great extent of coast is skirted nearly the whole way by dangerous broken reefs, called the Colorados, leaving shallow water within, navigable between the cays and numerous heads of rocks for consters drawing 10 or 11 feet water, which find an entrance near cape San Antonio, and through some intricate channels to the

* Captain R. Owen, R.N., anchored on and sounded over this bank, as did also the U.S. Steamer *Albatross* in 1884.

north-east. The outer limits of these great barrier reefs are but imperfectly defined, and should, therefore, be approached with the utmost caution, for the lead will give scarcely any warning, and the sea on the shoals seldom breaks. The land at the south-west part of this shore is so low as to be out of sight from the edge of the reef, and the current in the immediate vicinity is strong and extremely variable.

The edge of the bank, which passes a mile westward of cape San Antonio, runs about N. $\frac{1}{2}$ E. for 7 miles, with from 4 to $2\frac{3}{4}$ fathoms water on it, sand and rock; then N.N.E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles, where there is a detached 3-fathoms patch, nearly a mile outside the edge of the reef, on which there is from 3 to 5 fathoms water; thence it trends more to the north-east and eastward, skirting about a mile off the reefs with 4 to 8 fathoms water on it as far as Bahia Honda.

Nearly 15 miles N.N.E. $\frac{1}{2}$ E. of Cajon point lies the south-west extreme of these extensive reefs; thence running N.E. by N. for 24 miles to Buena-vista pass. The reefs are here 3 miles in breadth in the middle part, and 2 elsewhere.

The north-east extreme is 9 miles from the land, the central part 13, and the south-west extreme 11 miles. The outer edge of the reef at Buena-vista pass, appears to be about 5 or 6 miles from the west end of the cay of the same name, the first islet met with coming from the south-west, and which may be seen 12 miles. From this pass the line of reefs continues to the north-east for about 45 miles, and then trends more easterly until it almost joins the shore westward of Bahia Honda. These remarks are intended merely as a general description of the limits, and by no means to direct a vessel along the edge of these dangers.

Leña Cays, lying between Cajon and Guanah points, and about 6 cables from the land, are separated from each other by deep channels, but with little water at the entrances. The largest of them, named Afuera, is marshy, and covered with mangroves of moderate height. On its north side there is a small sandy shore, with some huts for fishermen watching for turtle; this cay extends $2\frac{1}{2}$ miles east and west, is $2\frac{1}{2}$ miles from the main land, and forms with it a large bay almost land-locked, for it is sheltered on the east by a point which projects out 2 miles; between this point and the eastern shore of Afuera cay is Barcos channel, where vessels under 15 feet draught may lie in security during bad weather.

The points at the entrance to Barcos channel lie east and west of each other, with a small reef extending from each point, leaving a clear channel about a cable in breadth. There are $2\frac{3}{4}$ fathoms at the entrance, mud bottom, which deepens inwards to $4\frac{3}{4}$ fathoms, and the channel widens to $2\frac{1}{2}$ cables; from this point, which is about half-way in, it begins to

narrow, and the depth diminishes as far as a small nearly submerged cay, in the vicinity of which there are $1\frac{1}{2}$ fathoms water; this cay forms a little channel about a fathom deep, which admits small vessels to the bay just mentioned.

The channel is $1\frac{1}{2}$ miles in extent east and west. It is necessary to have a fair wind to enter, but having passed the points a vessel may anchor as convenient; the mangrove shores are clear of danger, and there are 5 fathoms water close to. In leaving it will be necessary to tow or steam out until outside the points, unless the wind should be fair. With local knowledge, a vessel drawing less than 15 feet water, exposed without the Colorados reefs, may find shelter at this anchorage. Within the bay to which the Barcos channel leads there are some small cays, with narrow channels between them navigable only for boats; elsewhere the depth in the bay is from about one to $1\frac{1}{2}$ fathoms, mud.

To the westward of Afuera cay there are three others, covered with mangroves to a moderate height, lying north and south, of which the smallest and northern is named Leña, and the others Rebellines. From the southern cay a rocky ledge runs to the southward with little water over it, and near it there are $1\frac{1}{4}$ fathoms water, mud. Between these cays and Cajon point, the water is sufficiently deep to enable vessels to reach the bay which they form with the coast, and anchor to the southward of the Rebellines, rounding the ledge in 2 or $2\frac{1}{4}$ fathoms, mud, about midway between the cay and coast, and sheltered from northerly winds. In this channel the depth varies from 2 to $2\frac{3}{4}$ fathoms, decreasing as Cajon point is approached. Near the coast there are some rocky heads.

Caravela Chica and Grande Points.—From Caravela Chica point the coast trends about N.E. by E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles to Caravela Grande point; thence, forming several bays, N.E. $\frac{1}{2}$ E. $6\frac{1}{2}$ miles to the western extremity of Plumajes point. Half a mile northward of Caravela Chica point there are several rocky heads, with 3 feet water on them; but thence as far as Plumajes point there are no dangers, and the bottom is mud.

Plumajes Point.—From the western extremity of Plumajes point the coast runs eastward 2 miles to its eastern extremity; this part of the coast, although not very high, is somewhat more elevated than elsewhere, by which it is easily known. At the eastern extremity of this land a ridge of rocks extends three-quarters of a mile to the E.N.E., and as the bottom for 2 miles in the same direction is of rock, a vessel should not anchor here, especially with northerly winds. Six miles eastward of Plumajes point is Tolete point, and $4\frac{1}{2}$ miles farther is Guadiana point, the land between forming a bay a mile deep, with $2\frac{1}{4}$ fathoms water.

Guadiana Bay. — Three-quarters of a mile northward of Guadiana point is Algodonar point, forming between them the entrance to Guadiana bay. From these points the coast runs eastward on either side for three-quarters of a mile, forming a channel half a mile in breadth, which is narrowed by mud-banks having about one and $1\frac{1}{2}$ fathoms water on them, which extend off on either side for one to 2 cables.

The navigable channel varies from one to 2 cables in breadth, and carries about $3\frac{1}{2}$ fathoms water, as far as the entrance to an inner bay, which runs to the north-east. The outer bay is nearly circular, and 4 miles in extent, and where, in the fairway channel, there are $2\frac{1}{2}$ fathoms water. Being in the centre of the bay and anchored in the middle of the passage, in $2\frac{1}{2}$ fathoms, southward of a small beach, a vessel will be sheltered from all winds. On the beach there is a lagoon with fresh water. Before arriving at the entrance of the river, which lies to the N.N.E., a ridge of rock extends 2 cables S.E. from a point named Gerónimo; the passage having $1\frac{1}{4}$ fathoms water is between this reef and the southern shore.

Within the river there are about 7 feet water, and its breadth is from one to $1\frac{1}{2}$ cables.

Colorada Point. — From Algodonar point the coast forming a bay trends N.W. by N., $3\frac{1}{2}$ miles to Colorado point, from which a sand bank extends three-quarters of a mile westward. North-west, $3\frac{1}{2}$ miles from Colorado point, is Pinalillo point, forming between the bay of Garnacha. In this space the coast is a little elevated, and covered with pine trees.

Garnacha Bay. — This bay is sheltered from all except westerly winds, and as those are generally at the time of squalls and rains, and mostly of short duration, there is no danger except at the equinoxes, when it is exposed.

The bay is spacious, the bottom mud, and in its centre, $1\frac{1}{2}$ miles from the land, the depth is $1\frac{3}{4}$ fathoms at high water; at 2 cables from the shore it is about a fathom deep, enabling small vessels to approach at low water. In the middle of the shore there is a small beach, with a landing place and a road leading to the towns of Mantua, Guane, and Pinal del Río; the former, the principal and nearest, is 18 miles distant. Water can be had during the rainy season from a lagoon at a little distance from the beach, but in the dry season it is procured from a river which runs into the bay.

San Francisco. — Pinalillo point is foul, and $4\frac{1}{2}$ miles north-west of it is Avalos point, which is a narrow tongue of land projecting seaward more than a mile. There is anchorage under its lee sufficiently clear of danger during the season of northerly winds. Between the two points is a

bay 2 miles deep, where there is an inlet, and within which is the loading place of San Francisco.

Buena-Vista River.—From Avalos point the coast, of little elevation, forming several small bays, trends about N. by E. $\frac{1}{2}$ E. 11 miles to the mouth of the river Buena-vista. All the coast from Algodomar point to this river is tolerably clear of danger.

Arroyos Anchorage.—Between the point of Buena-vista river, the cay of the same name and Ingleses point on the south, is Arroyos anchorage, sheltered from all winds from N.W. round by north and east to S.W. It is clear of danger, with a depth of $2\frac{3}{4}$ fathoms, which gradually diminishes to the shore. In the middle of the bay which forms the anchorage there is a wooden pier, by which coasting vessels load and unload.

This is the principal loading place of Mantua, 9 miles inland. To reach this anchorage from the northward, a vessel should enter Buena-vista pass and steer between the Coloradas and the reef extending from Buena-vista cay, the depths in the channel being from $2\frac{3}{4}$ to $3\frac{3}{4}$ fathoms. The channel between the reefs at the east end of the cay and Buena-vista point on the mainland opposite, carries about one fathom water, which is used by small steamers, and sailing vessels with a fair wind.

Buena-Vista Cay, separated from the coast by a channel about a mile wide, is the largest of all those on this part of the coast. This cay is 5 miles in length east and west, and one mile in breadth; it is low and marshy, and divided in the middle by an inlet navigable by boats. From its north-west point a mud-bank extends off a cable, and near the western point there are 6 feet water. A small cay lies off the former point with a passage between for boats and also another small cay, named Abra, off its north side.

One mile N.W. of the cay is a bank about 7 miles in length N.E. by N. and S.W. by S., and one mile in breadth, with about 5 feet water on it; but there are passages between it and the reefs.

Buena-Vista Pass lies about W.N.W. 5 miles from the north-west point of Buena-vista cay; it is of moderate breadth, and not less than $3\frac{1}{4}$ fathoms deep. From this pass to that of Rancadora the breadth of the reef is not less than a mile.

Rapado Cay.—About 6 miles N.W. by N. from the north-west point of Buena-vista cay is the western part of Rapado cay. This cay is 3 miles in length N.E. by N. and S.W. by S., and partly marshy, with mangroves. A reef extends about 3 cables from its northern part, with $1\frac{1}{4}$ fathoms water on it; and a similar reef projects 2 cables N.W. from the western point. The distance from this cay to the coast is 3 miles, where the loading

place named Canas is situated, and which is south of the cay. The passage between the cay and the coast is only navigable for small coasting vessels of about 4 feet draught.

Two miles westward of the west point of this cay lies a rocky bank with $5\frac{1}{2}$ feet water on it, named Vinagera. To the south-west and near the cay are two small cays, named Toro and Vaca.

To the N.E. by E. of Rapado cay, over a space of 6 miles, lie four banks of sand and mud with scarcely a fathom water on them. There are passages between the extremities of the shoals and Rapado and Diego cays, but small vessels only can pass between the banks. The passage between the banks and Rapado cay is a mile wide and of moderate depth; that between the banks and Diego cay is the same in breadth, and from $1\frac{3}{4}$ to $2\frac{1}{4}$ fathoms deep, mud bottom. These passages are useful in proceeding to the bay and loading place of Santa Rosa, where coasters load with tobacco, wood, &c.

Rapado Chico Cays.—Half a mile southward of Rapado cay is the northern of the Rapado Chico, a group of four extending north and south 2 miles. The passage between the latter cays and Rapado is $1\frac{1}{4}$ to $1\frac{3}{4}$ fathoms deep, and leads to the loading places of Santa Isabel and Canas. The channel between the southern Rapado Chico and Buena-vista is $1\frac{1}{4}$ to $1\frac{3}{4}$ fathoms deep, clear of danger, and 2 miles in breadth.

Rapado Pass.—From Buena-vista pass the reef trends N.E. 10 miles to Rapado pass. This channel lies N.W. by W. $2\frac{3}{4}$ miles from the north end of Rapado cay, and the least depth is $2\frac{3}{4}$ fathoms, rocky bottom.

Canas and Santa Isabel.—From the river Buena-vista, the coast runs about N.N.E. $\frac{1}{2}$ E. 4 miles to the north point of the loading place of Santa Isabel, and thence with some sinuosities about N. $\frac{1}{2}$ E. 3 miles to the point north of the loading place of Canas, when it trends to the eastward 2 miles to the head of Santa Rosa bay.

Santa Rosa Bay and Diego Cay.—From the head of Santa Rosa bay the coast runs about N. by E. $\frac{1}{2}$ E. $6\frac{1}{4}$ miles to Tabaco point. Three miles S.W. $\frac{1}{2}$ W. of Tabaco point, and $1\frac{1}{2}$ miles from the coast, lies Diego cay, which is $1\frac{1}{2}$ miles in length east and west, and a mile in breadth. From its north end a reef extends three-quarters of a mile to the north-west, and then trends as far and round Tabaco point to the western point of Baja bay. This reef is of rock, and has less than one fathom water on it. To the E.N.E. of Diego, and near the coast, are two small marshy cays named Eslabones; and eastward of these, two others at a distance of 3 or 4 cables, the larger of which forms Tabaco point, and the smaller, at a cable E.S.E. of it, is separated by a narrow channel. Diego cay is 3 miles N.E. by E. of the north-east extremity of Rapado cay.

Diego and Roncadora Passes.—From Rapado pass the reef runs N.E. $\frac{1}{2}$ E. $3\frac{1}{4}$ miles to the first of the Diego passes, and after forming

the second 2 miles farther to windward, continues N.E. 4 miles to Roncadora pass. The two passes of Diego are $1\frac{3}{4}$ fathoms deep; the weather one lies N. by W. $\frac{1}{2}$ W. 3 miles from Diego cay, and the lee one N.W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles. The Roncadora pass runs W.N.W. and E.S.E., is a mile in breadth, and $2\frac{3}{4}$ fathoms deep.

Baja Bay.—From Tabaco point the low coast, without anything remarkable, runs about N.E. by E., $2\frac{1}{2}$ miles to the western point of Baja bay. This bay is protected from the sea during northerly winds by the reefs which are not far distant. There is a loading place here, and the bay is frequented by vessels under $7\frac{1}{2}$ feet draught.

The small town of Baja stands a little more than 3 miles inland.

Alonso Rojas Point.—At $2\frac{1}{2}$ miles N. by W. from the loading place of Baja is Alonso Rojas point, which is formed by several small cays close to the shore. Thence, the coast, after forming a large bay, trends about N.E. with various sinuosities as far as the point southward of Jutias cay; the western extremity of which lies about N.E. by N. 7 miles from Alonso Rojas point.

Jutias Cay is nearly 3 miles east and west, and 12 in circumference; the northern part of it is firm land, but the southern is marshy; at its western end there is a fisherman's hut. It is separated from the coast by a channel about a cable in breadth, navigable only with difficulty by boats and canoes.

Galera and Jutias Passes.—From Roncadora pass the reef runs about N.E. 6 miles to Galera pass; its breadth in places is $1\frac{1}{3}$ miles, and its outer part is about 5 miles from the coast. Galera pass is about 6 cables wide, and in its middle $2\frac{3}{4}$ fathoms deep; it lies 2 miles West of the north-west point of Jutias cay. Jutias pass is one fathom deep, and formed by a reef on the east, and a ridge of rocks almost awash extending from the north-east point of Jutias cay; this pass is divided into two narrow channels by a bank with little water over it.

Reef between Jutias and Leviza Passes.—From Jutias pass the reef runs about N.E. 13 miles, and then trends E. $\frac{3}{4}$ N. 13 miles to Leviza pass. Its greatest breadth is $1\frac{1}{2}$ miles, and the outer line from 4 to 6 miles from the land.

Santa Lucia Point.—From the north point of Jutias cay, its shore and the main land run S.E. 3 miles to the head of a shallow bay; thence it trends N.E. by N. for 6 miles to Santa Lucia point. Two miles farther on is the western point of Malas-aguas bay.

Malas-aguas bay is about 2 miles across at the entrance, and $1\frac{1}{2}$ deep. From its eastern point the coast trends about E. by S. $2\frac{1}{2}$ miles to

the mouth of the river Azúcar, where half a mile up is good fresh water, and the best found anywhere within the reefs.

About $1\frac{3}{4}$ miles N.W. of the mouth of the river is the small cay Boquerones, separated from the weather point of the bay by a channel $1\frac{3}{4}$ fathoms deep, but in navigating it a pilot is necessary, as the shore is bordered by reefs.

Inés de Soto Cay extends N.E. and S.W. $4\frac{1}{2}$ miles; its northern part is firm land, but the southern is marshy. Seen from the northward the cay appears to be divided by a small channel, but which is only an inlet $1\frac{1}{2}$ cables deep. Two cables off Gallegos, the north-west point, is a mud-bank with about one fathom water on it, which extends a cable east and west, and half a cable in breadth. Between this shoal and the outer reefs is the channel nearly a mile wide, and $1\frac{1}{2}$ fathoms deep, and which is used by coasters. The south-west point of this cay lies about N.E. $\frac{1}{2}$ N. three-quarters of a mile from Boquerones cay.

San Cayetano Bay is formed on the west by Inés de Soto and Legua cays, and on the east by Lavandera point. On the shore there are several storehouses for copper ore, and a wooden pier. It is clear of danger, and the bottom mud. In proceeding for this bay it will, however, be necessary to guard against a reef which extends 4 cables S.E. $\frac{1}{2}$ E. from the east point of Inés de Soto cay. The best berth is in two fathoms water, with the east point of Inés de Soto cay bearing N.W., and Lavandera point N.N.E.

Lavandera Point.—About 2 miles eastward of the east point of Inés de Soto cay is Lavandera point, the extreme of a cay, which is separated from the main by a narrow channel affording communication between San Cayetano and Berracos bays. The cay is $1\frac{1}{2}$ miles in breadth; its north part is firm land, but elsewhere, except a small beach on the west coast, it is marshy and covered with mangroves.

Berracos Bay.—About $1\frac{1}{2}$ miles eastward of Lavandera point is a group of three small cays, marshy and covered with mangroves, named Uvas; three-quarters of a mile S.E. of these cays is a point which, with the western of the Berracos cays, about a mile to the north-east, form the bay of this name, which is $1\frac{1}{2}$ miles deep. Within the bay lies a small cay southward of the eastern of the Uvas.

Berracos Cays are two small cays united to the coast by a reef, which does not admit of vessels passing, and which shelters the anchorage. The channel between the western of the Berracos and the eastern of the Uvas, is $2\frac{3}{4}$ to $1\frac{1}{4}$ fathoms deep, mud bottom, which diminishes gradually to within 2 cables from the land.

Arenas Cay.—The Berracos form with Arenas cay the passage of this name. Arenas cay lies a mile northward of the Berracos, and is the nearest to the reefs, being separated from them by a narrow channel, 2 to 3 cables in breadth, navigable for boats. The cay is about half a mile in extent east and west; its southern part is marshy, and a small reef extends from its south-west end.

Purgatorio Point.—About $2\frac{1}{2}$ miles eastward of the Berracos is the mouth of the river Medio; thence the coast trends N.E. by E. 4 miles to Purgatorio point, forming between two small bays. Two miles farther on, and close to the coast, is the eastern extremity of two small marshy cays named Dios.

Leviza Cay.—A mile northward of Dios cays is the middle of Leviza cay, and in this space, reduced by a reef which extends 2 cables from the south side of the latter, the channel carries $1\frac{1}{4}$ to 2 fathoms water over mud. Leviza cay extends 2 miles east and west, and is divided into two by a narrow channel, fit for boats; its north part is firm land, but its southern marshy.

Nearly $2\frac{1}{2}$ miles S.E. of Leviza cays, is the entrance to the river Puercos, but the water is not good.

Alacranes Point and Cays.—At $2\frac{3}{4}$ miles E. by N. of Leviza cay is Alacranes point, with several cays near it, named Casigua and Alacranes, which are separated from each other by small channels used by canoes. Alacranes cay lies a little eastward of the pass of the same name, and separated from the reefs by a channel a mile in breadth, and 6 or 7 feet deep, named the Reduan pass; the north part of this cay is firm land, and the southern covered with mangroves; it is separated from the coast by a channel half a mile in breadth and about 2 feet deep.

Leviza Pass.—The outer edge of the reef passes $1\frac{1}{2}$ miles northward of Leviza cay, and after forming on the west the pass of that name, which has little water, trends about N.E. by E. 4 miles to Alacranes pass; thence leaving a space of about a mile between it and Alacranes and Casigua cays, N.E. by E. 3 miles; and then E. by N. 4 miles farther to Blanco cay pass.

Alacranes Pass carries only about a fathom water, and lies with the eastern part of Leviza cay bearing about S.S.W., and Alacranes point S.E. by E. Vessels of $6\frac{1}{2}$ feet draught enter and quit this pass regularly, and sail between the reef and coast as far as Jutias cay. Four miles E. by N. from Alacranes point is the small cay Ratones, and 2 miles E.N.E. from the latter is Blanco cay, also very small, and only seen from the reefs.

Mulata Bay.—About a mile S.W. from Blanco cay is the point and river of Medio, and a mile farther to the southward the bay and loading place of Mulata.

Gobernadóra Point.*—From abreast Blanco cay the coast trends N.E. $\frac{1}{4}$ E. $7\frac{1}{2}$ miles to the mouth of the river Manimani; thence with little elevation E. by N. 3 miles to Gobernadóra point, which lies W.N.W. $2\frac{1}{4}$ miles from the castle of Cerro del Bahia Honda.

Blanco and Manimar Passes.—The Blanco pass is $1\frac{3}{4}$ fathoms deep, and runs in about a S.E. by S. direction. From this pass the reef trends about N.E. by E. 5 miles to Manimar pass, where small vessels of $5\frac{1}{2}$ feet draught can enter; thence the reef runs a little more northerly, about $1\frac{1}{2}$ miles from the coast, to Gobernadóra point, from which it extends off about a mile; and then trending nearer the coast, terminates in the reefs off Pescadores point, at the west side of entrance to Bahia Honda.

Directions.—Vessels of 7 feet draught can navigate within the reefs, but with any sea the Alacranes pass is somewhat dangerous; it will therefore be better to take Galera pass. In passing near Diego and Rapado cays, care should be taken to avoid the banks in their vicinity. A vessel may pass east or west of the bank lying north-west of Buena vista cay. Near the reefs the bottom is rocky, and many isolated heads are met with, but near the coast it is sand and mud. There are several detached patches of 3 fathoms in the large opening between the Colorados and Cajon point, and nearly in mid-channel lies a bank, 5 miles in length, with only 2 fathoms water on its shoalest part; these can generally be avoided by the eye, the chart giving their positions.

Albatross Bank, so named from H.M. brig of that name having sounded on it in 1844, has 9 fathoms water on it, hard bottom, with the Saddle hill bearing E. $\frac{3}{4}$ S., and Buena-vista (seen from the topmast head) South. Capt. Sharp of the R. M. Co. steam vessel *Tweed*, in the same month, distinctly saw discoloured water and a ripple on the shoal, and stopped the vessel's engines to clear it, gives the following bearings taken near the shoal: Saddle hill E. $\frac{3}{4}$ S.; and Cockcomb mountains S. by E. The lat. given is $22^{\circ} 50' N.$, and long. $84^{\circ} 15' W.$, but as this does not agree with the bearings its exact position remains doubtful. H.M.S. *Royalist*, in 1866, found no bottom at 120 fathoms close to its supposed position. The U.S. Steamer *Albatross*, in 1884, sounded in the position assigned to this bank, and found bottom in 950 fathoms, coral and sand.

BAHIA HONDA† is a small well-sheltered harbour with a depth of from 3 to 6 fathoms. Its entrance, however, is so narrow and intricate,

* It is proposed to establish a revolving light, visible 15 miles, on Gobernadóra point.

† See Admiralty plan :—Bahia Honda, No. 411; scale, $m=2.2$ inches.

that a pilot is necessary in the absence of good local knowledge. The shore on either side of it is low and sandy. On the east side of the entrance is the small hill of Morrillo. The channel is about 2 miles in length north and south, and opens out into a land-locked basin, about a mile in diameter, but the interior is only fit for small vessels. From the base of the Morrillo a coral ledge runs off three-quarters of a mile to the north-west; and from Pescadores point, on the opposite side, a similar ledge runs off 3 cables to the north-east, and the navigable channel here between the banks is not more than $1\frac{1}{2}$ cables wide.

From the Morrillo the shore trends S.W. about half a mile to Real point, and the distance across to Cayman point on the western shore is about 3 cables. The former point may be approached to about three-quarters of a cable, and the latter to half a cable. From Real point the eastern shore trends South nearly three-quarters of a mile to Carenero point, and one-third of a mile to the southward of this is a low mangrove cay called Largo, the west end of which, Difuntos point, is seen from the entrance. This point is foul to the north-west for 2 cables, and the channel is here again narrowed to about 2 cables by this, and the sand-bank lying a quarter of a mile off the western shore. Within this is the basin.

Water can only be obtained in small quantities at Bahia Honda.

Directions.—To enter Bahia Honda a good offing should be kept until the entrance bears S. $\frac{3}{4}$ E. As it is approached on this course, Difuntos point will open out between the sandy points; at the same time a remarkable square-topped hill will be seen in this direction at the back of a large sugar estate. The east end of this hill in one with Difuntos point will lead through the entrance of the harbour in from 16 to 5 fathoms water; be careful then to keep the weather side aboard. When abreast Carenero point a vessel may anchor in 6 fathoms, or she can steer on to the south-west, and anchor just within Difuntos and Mangles points, in the same depth. The former berth will be the most convenient for leaving with the land wind.

CABAÑAS.*—From Bahia Honda the coast trends E. by N. 14 miles to the entrance of port Cabañas. The shore between is foul, and should not be approached within 2 miles. This port is sheltered from all winds, with $3\frac{1}{2}$ fathoms, the least depth at the entrance; and within from 7 to 13 fathoms. To the southward of the port there is a ridge of mountains 1,420 feet high towards the western parts from whence it slopes gradually

* See Admiralty plan :—Port Cabañas, No. 410; scale, $m = 0.86$ inch.

down to the eastward into an extensive plain between it and the table land of Mariel. A rather remarkable peak, at the east end of the ridge, bears S.E. $\frac{1}{2}$ E. from the entrance of the harbour, and near the centre of the heights there is a conspicuous large gap. The peak of Guajaibon bears about S.W. by W. from the entrance, and is also a guide from the offing.

On the east side of the harbour the land forms two low ridges or hummocks, and at their west end there is a large sugar estate, standing on the point at the entrance, and one of the buildings is dome-shaped. The entrance from shore to shore is $1\frac{1}{2}$ miles wide, and when bearing South a martello tower, with a few small buildings near it, will be seen about 2 miles within. The tower stands on the extreme end of an islet or cay which divides the harbour into two large basins or arms, which afford good anchorage. A coral ledge extends off upwards of three-quarters of a mile from the weather shore, and 2 cables from the lee side, leaving a channel about 3 cables wide.

Supplies.—Wood may readily be obtained at port Cabañas, but water is scarce. Fish is in abundance.

Directions.—When steering for port Cabañas, having opened out the tower, bring it to bear about S. by E., when it will be in one with a remarkable gap on the heights above. This mark will lead to the entrance of the channel in from 16 to 9 fathoms water, over sand. When the first point on the western coast, called Arbolitos, bears West, the depth will decrease to 7 fathoms; then alter course to S. by E. $\frac{1}{2}$ E., carrying 6 to 4 fathoms in mid-channel, and the water will deepen to 13 fathoms on nearing Pescadores point. With the gap open a little to the eastward of the tower a vessel will carry in 22 feet water; and with it open to the westward, double the breadth of the tower, she will have 20 feet.

Having passed Pescadores point, haul up and anchor close under the weather shore in 7 to 9 fathoms, mud, near the entrance of the south-east arm; or keep away and come to in the south-west arm, in about 9 fathoms water, under the lee of the tower. In doing this, however, be careful to avoid a patch of rocks and sand, about a cable in extent, and on which there are $2\frac{1}{4}$ fathoms water; it lies nearly half a mile N. $\frac{1}{2}$ W. from the tower, and may be seen from aloft.

In leaving the harbour it will be desirable to weigh with the early land wind, to ensure its carrying the vessel well out before it fails, as there is generally a heavy swell in the offing, and frequently a strong south-west eddy, which might set her on the reef skirting the shore.

PORT MARIEL* is about 12 miles to windward of Cabañas and 21 miles to leeward of Havana. The shore in its vicinity becomes a little more elevated; and a short distance inland, to the eastward of the port, there is a remarkable long flat ridge, of moderate height, with a notch or step at its east end, called the Table of Mariel, which cannot be mistaken; and a little westward of it will be seen a remarkable cliff in the harbour, facing westward. The entrance lies about N.W. from the west end of the Table, and on its eastern side there is a martello tower and some huts, and when the former bears S. by E., a church and several buildings will open out in the interior.

The port is about 2 miles deep north and south, and well sheltered, but its entrance is only 50 yards wide, and the least depth 4 fathoms. The eye will be the best guide in entering, and when within the narrowest part keep the weather shore aboard until abreast of Gorda point on the west shore, on which there is a small fort, when the vessel may anchor in 5 or 6 fathoms in safety.

Buoys and Beacons.—On the weather or eastern side of the entrance are two buoys, one on los Cabazos abreast of Pt. Barlovento, the other further in on the most projecting point of the shoal water; on the western side of entrance there is a beacon on Cayuelo, $14\frac{3}{4}$ feet high, surmounted by a ball, next a buoy on the edge of the shoal, which, with the buoy opposite, marks the narrowest part of the channel; there is also a buoy on the N.E. extremity of the reef off Regla point.

To the westward of the entrance the shore is skirted by a reef for half a mile; be careful, therefore, to avoid being becalmed off the port, as the reef is steep-to, and frequently a strong eddy sets to the south-west.

Managua Paps.—The shore eastward of Mariel becomes rather low and flat until within a mile or two of Havana, when it rises to a few small fortified hills; and 10 miles South of the Morro there is a remarkable isolated hill, 732 feet high, with two round hummocks, called the Managua paps. This hill is not only an excellent guide for Havana when coming from the northward, but useful also as a point of departure.

HAVANA.†—The entrance to this port may be readily recognized by the Morro castle, and the extensive line of fortifications on the cliffs, which overlook the city to the eastward, at the height of about 150 feet. The land to the eastward of it, until near the Jaruco or Iron hills (page 433) is about 200 feet high, and the shore bold and steep-to. The city is the seat of government of the island of Cuba, and with the suburbs is

* See Admiralty plan :—Port Mariel, No. 413; scale, $m = 3$ inches.

† See Admiralty plan :—Havana, No. 414; scale, $m = 9\cdot25$ inches.

said to have a population of nearly 250,000, and is the greatest commercial place in the West Indies. The number of British vessels which entered during 1864 was 601, tonnage 173,757, and value of cargoes 2,793,025*l*. Vessels cleared during the same year, 513, tonnage 154,180, and value of cargoes 3,467,400*l*.

The entrance to the harbour lies nearly N.W. by W. and S.E. by E., and the channel for about 4 cables is not more than three-quarters of a cable wide, when it begins to widen, and it then opens out into an irregular-shaped basin, 2½ miles in extent N.E. and S.W., and from a half to a mile in breadth. The Morro point, the north point of the entrance, is steep, and a vessel of the largest draught may pass almost close to it. The soundings extend off in a N.W. by N. direction for about half a mile from the point.

The northern shore of the channel is bordered by the Carbrestante bank, which at the outer part extends off more than half a cable; it is marked by five conical *black* buoys.* The southern shore is also bordered by a sand-bank named San Telmo, which about half-way in extends a cable off with only 15 feet water on its edge; this side of the channel is marked by three conical *red* buoys. Within the harbour, the edges of the shoal that extends off the Regla bank are marked by three *red* buoys, and the square trunk buoys are moorings; one of the latter may generally be obtained by permission from the Health Officer. Within the harbour the western shore is bold, and vessels lie alongside the wharves of the city. The arsenal is in the south-west angle of the harbour. From the sewerage, and the tidal stream being weak, the water is very foul.

Dock.—Vessels generally refit alongside the moles or places for that purpose in the northern part of the port, where there is an iron floating dock, 200 feet in length and 80 in breadth, capable of lifting 2,800 tons and stated to be capable of receiving vessels of 20 feet draught, belonging to the Havana dock company. Near the dock are two warping buoys.

LIGHT.—A lighthouse, 79 feet high, stone colour, stands on the Morro castle, at the north-east side of the entrance of the harbour, and exhibits a white light, revolving every *half minute*. The light is 144 feet above the sea, and may be seen 21 miles.

Pilots.—A pilot will be found off the Morro, by making the usual signal; but, except to a stranger, one is scarcely necessary.

Water.—Vessels of war water very conveniently from government tanks, which are allowed to be sent for on making the necessary application. The water is not always good after rain.

Coal.—A supply of coal can always be depended upon.

* The buoys are not to be depended on, particularly as to the colour.

Time Signal.—A time-ball situated near the Harbour office is dropped at noon; mean time at place, but it is stated not to be very accurate. A meteorological observatory is established in the Jesuit monastery, where ships' chronometers and instruments can be adjusted.

Tides.—It is high water, full and change, in Havana harbour, at 8h. 14m.; and the rise is about 3 feet. There is no regular flood and ebb, but with the land wind a slight stream usually runs out.

CURRENT—Directions.—Vessels bound to Havana from the westward, having rounded cape San Antonio, with the usual trade wind, may haul to the wind. If the weather reef should be closed, a good look-out for shoal patches should be kept. The current generally sets to the south-west on the edge of the Colorados bank; it will therefore be better to stand to the northward, as far at least as the parallel of 24°, before tacking. (Page xxxiv.)

Nothing is more uncertain than the point where the Florida or Gulf stream is first met with; sometimes it will be found 50 miles to the south-west of the Tortugas islands,* and at others it will not be felt until close up to the west end of Tortugas bank, or 30 or 40 miles South of those islands; the vessel's position by chronometer should therefore be ascertained as frequently as possible. Under any circumstances it will be better to avoid the Cuba shore until the vessel is well to the eastward, when it may be necessary to sight the high lands in order to check the reckoning. In approaching the Cuba shore, the easterly stream will seldom be met with until nearly on the meridian of Havana, or on the line between it and the Tortugas. At times it runs at the rate of from 2 to 3 knots close off the harbour, and from thence in a N.E. direction through the Florida strait; occasional cessation of this stream has been noticed.†

It frequently happens that having arrived at a position South of the Tortugas without feeling the influence of the stream, it is perhaps entered soon after the reckoning has been checked in the evening, and in making the land on the following morning the vessel will be found far to windward of the port. The features of the land to the eastward, however, differ so considerably from those to the westward, that there will be no difficulty in making out the position. The land eastward of the Morro is about 200 feet high and rather flat, but about 18 miles to windward it rises into a remarkable ridge of irregular hills of moderate height, about 3 miles in length east and west, and a short distance from the shore, called the Jaruco hills; whilst 18 miles westward of the Morro is the Mariel table land, and farther on in the same direction the hill of Cabañas.

* See Admiralty chart :—West Indies, sheet 1, Florida strait, No. 1,217; scale, $m = 0.03$ of an inch.

† The Florida or Gulf stream is also treated of in Chapter I., Vol. I., 1883, p. 15–17.

About 13 miles eastward of the Jaruco, and 7 miles South of Guanós point, is the peak of Matanzas, a large massive mountain, rising to the height of 1,277 feet, which can be seen nearly 40 miles, and cannot be mistaken. Seen from the north-west its summit forms three hummocks, the centre one being much the highest, rising from behind a flat rocky ridge of land of moderate elevation. From the north-east it appears as a prominent rounded mountain standing out by itself, and becomes a valuable point of departure. Should the vessel be found in a position thus far to windward, or less, it will be better to stand in, and run down within about 2 miles of the shore, to avoid the current; taking care, however, to steer clear of the Jaruco bank, on which there are only 11 feet water, and which lies about $1\frac{1}{2}$ miles off shore. The discoloured water on this bank, which is of some extent, may be seen from aloft in clear weather, and moderate depths appear to extend for a short distance along the shore, increasing abruptly to 90 fathoms.

* Vessels bound to Havanna from the north and east will navigate either by way of the Providence North-west channel, across or along the western edge of the Great Bahama bank, round the Elbow of the Double-headed Shot cays, and thence across towards Guanós point in Cuba, out of the stream; or through the Old Bahama channel, page 466.

Entering Havana, under sail, time will be saved by waiting until the sea breeze has set well in, which commences about 10 a.m., and may be seen from the direction the flags are blowing on the inner heights. In the winter months, from October to June, a vessel will generally fetch up to the anchorage; but in the summer, as the wind prevails to the southward of East, she may have to warp in. In the former case, if coming from the eastward, after passing the Jaruco tower and bank westward of it, run down about half a mile or more off shore, and having brought the lighthouse to bear about S.S.E. (not before, in order to avoid any sweep), haul up under all plain sail, so as to shoot as far in as possible, and with both anchors clear.

Having passed Morro point at the distance of half a cable, hug the north-eastern shore as near as the wind in general allows, but in a vessel of heavy draught do not go inside the buoys on either side of the channel. The helm must be quickly and well attended, to take advantage of the strong gusts and flaws; and the weather head braces and spanker brails should be in hand, ready to assist it. Having passed the valley between the Morro and Cavaña heights, the wind will become exceedingly variable; but with great attention to the steerage, the vessel will shoot to windward of the red buoy No. 2 on the edge of San Telmo bank, and through the narrows into the harbour.

* See page xxxiii.

When off the east end of the heights the breeze will be more steady, and the sail may then be reduced to enable her to take up a convenient berth among the numerous shipping. Should it be necessary to anchor in the narrows, give a good scope of cable, and shorten sail quickly to avoid dragging, as the wind rushes off the shore with great violence.

If the sea breeze hangs to the southward of East, the vessel will have to be warped in, and most probably to be kedged up the outer part of the channel. In this case, when coming from the eastward and having passed the Morro close aboard, stretch over to the Punta shore, and having tacked under it, shoot in as far as possible, and anchor under the northern shore, waiting until the breeze slackens in the afternoon to warp up.

A good berth for a ship-of-war is in the north-west part of the harbour just past the floating dock; the water here is cleaner. Unless the shipping are crowded, there is no necessity to moor, anchors bury themselves in the mud.

There will be no difficulty whatever in quitting the harbour, as the regular land wind is seldom interrupted except by Northerers, which sometimes throw a heavy swell into the harbour's mouth. The best time to enter is about midday, and for quitting it daylight.

The North Coast of Cuba from cape Maysi,* the east extreme, trends N. by W. $\frac{3}{4}$ W. for nearly 2 miles, to Hembra point, near which a portion of the coast of about a cable in extent is formed of soboruco, and here the light-tower† stands. About $3\frac{1}{2}$ cables northward of the tower is Mangle point, and entrance to the river Maysi, and 3 cables farther on is Estaca point.

Azules Point.—From Estaca point the shore, forming a slight bay, trends in a N.W. $\frac{1}{2}$ N. direction for a mile to Azules point; then follows the opening of Azules, where the beach ends, and another portion of soboruco extends for about half a mile to a small beach half a cable in extent, and then continues for three-quarters of a mile as far as the beach which terminates in the northern extreme of the headland of Maysi.

Puertos and Rasita Points.—From Azules point the coast, after forming three small sandy bays, continues low and of soboruco to a point rather salient, named Puertos, on account of several openings formed by the land in its vicinity, and thence to another point more salient called Rasita.

* See Admiralty chart :—Cuba, Eastern portion, No. 2,580; scale, $m = 0.12$ of an inch.

† See page 368 for particulars of light.

Maysi Reef.—The headland of Maysi is comprised between Pintado and Azules points, a space of about 5 miles. It is skirted by a reef at the distance of $1\frac{1}{2}$ to $2\frac{1}{2}$ cables, which terminates at the latter point; it is awash, the sea constantly breaks over it, and there are several openings through it for boats and very small vessels. The openings most used are those of Hembra, Mangle bay or Estaca leading to the river Maysi, and Azules; the others are not navigable with a fresh breeze. The opening into Mangle bay is almost always practicable, being about 130 yards in breadth, and 7 fathoms deep, but a rocky head with a little more than a fathom water on it lies on its south side.

This is the only regular anchorage within the reef used by small vessels, where there are 7 and 8 feet water, sand and weed, but seek for a clear place between the rocks.

Maysi Bank.—A rocky bank borders the Maysi reef, all along, with about 9 fathoms water on it at the distance of $2\frac{1}{2}$ to $3\frac{1}{2}$ cables, and a mile from it there are from 73 to 90 fathoms, sand, gravel, and rock. Caye Maysi is 6 cables eastward of the meridian of the lighthouse, and where the reef is most dangerous during the night. Vessels from the northward bound to the southern coast should be careful to steer sufficiently eastward to clear the reef; and in rounding the cape from the southward, the light should be brought well westward before steering northward.

Tides.—Near the land off cape Maysi, the flood runs westward, and the ebb eastward. During the summer months with southerly winds, easterly currents will be experienced, and with northerly winds southerly currents.

Bagá Point.—From Azules point the coast begins to rise, and runs about W.N.W. for 5 miles to Fraile point. Between Rasita and Bagá points the shore is of soboruco and forms a bay. Bagá point is a little salient, and known by three large rocks above it. About 2 cables within these rocks there is a well of good water, but it is difficult to approach the coast on account of the heavy sea which breaks on it.

Fraile Point.—Rasa point is next west of Bagá point, and the shore between forms an indentation as far as two large rocks. Thence the coast of steep soboruco continues as far as a large rock called Fria cave; from here it is of low soboruco, with an inner range of the same kind of cliffs at a little distance from the shore, and continues to Fraile point. Fraile point is salient, high, with a rock at its foot resembling a friar's hood hanging down. About a cable westward of it there is a spring issuing from the rock. The coast as far as Fraile point is clear of danger, and thence about 8 miles westward to port Mata it can be approached to the distance of a mile.

The Coast from Fraile point forms a slight indentation as far as Mangoritta point, which is somewhat salient; and on its eastern part is a

small bay, where there are five rocks. The coast then continues straight to the Guanál leap, which is high and abrupt thence the shore is of low soboruco to a point a little salient, named Guanál, with a wood of palm trees on it. Then follows Frailecito, similar to Fraile point but smaller, and lastly that of Silencio; from this point the first part of the coast is of soboruco, and then sand and gravel as far as the mouth of the river Yumuri.

Between Bagá and Silencio points the coast is clear of danger, and there is no bottom with 90 fathoms half a mile off. From the river Yumuri a high mountain ranges along near the coast, diminishing in height as Rasa and Bagá points are approached, and terminating a little southward.

Yumuri Reef.—The river Yumuri runs through a great break in the mountains and disembogues 4 cables westward of Silencio point. From this point a reef extends off half a cable, and skirts the shore as far as the mouth of the river, where it joins a gravel bank which in places is $1\frac{1}{2}$ cables from the shore, and terminates at the Redondo rock, which has a shore of gravel and sand between it and the river.

In consequence of the reef and bank, and the narrowness and little depth of the mouth of the river, it is difficult to enter with small vessels unless in the rainy season. The water is drinkable half a mile from the mouth. At Redonda rock the coast begins to be of high soboruco, which ends in Gorda rock.

Barigüita River.—Westward of Gorda rock the rock of Barigüita begins, terminating in a point of soboruco, named Larga beach; in the middle of this there is an isolated hill of soboruco, at the foot of which, on the western side, the river of the same name empties itself good water may be obtained at its mouth, which is sheltered by a reef of rocks extending half a cable from the isolated hill. At the termination of this shore near Larga beach point there is a lake of salt water, but its mouth is only open during the rainy season.

Yumuri Anchorage* is in the bay between Silencio and Larga beach points, where vessels may anchor in 11 fathoms water, sand and mud, $3\frac{1}{2}$ cables N.W. of Redondo rock, and W. by S. of the mouth of the river, distant $2\frac{1}{2}$ cables from the reef. There is no shelter from northerly winds. Besides the reef and bank of Yumuri there are other dangers at this anchorage. The Gorda rock patch is about 28 yards in extent, and about a cable to the N.W. of the rock. The Barigüita reef extends off $1\frac{1}{2}$ cables from the middle of the shore, immediately westward of Gorda rock, with various rocks awash, one of which is named Buren. Lastly Baraguita shoals form a group $5\frac{1}{2}$ cables in extent east and west, and one cable north

* See plan, Yumuri bay, on sheet No. 435; scale, $m = 1.9$ inches.

and south, in front of the beach of Baragüita, from which it is distant from one to $2\frac{1}{2}$ cables; the eastern extreme of this group is $1\frac{1}{2}$ cables from Barigüita reef; several of the heads composing it are visible, and between them are $4\frac{1}{2}$ and 5 fathoms water over sand.

Larga Beach Reef.—At Larga beach point the beach of Barigua begins, terminating at Sanamé point, which is salient and of soboruco; then follows the beach of Manglito as far as another similar point named Silverio; this latter point is succeeded by the beach of Careyes, which terminates at Boquerones point; afterwards the coast is of rock, forming three small entrances called the Boquerones, as far as the small beach of Quibungo; thence the coast continues of rock to Mata point at the entrance to the port of this name.

From Larga beach point a reef skirts the coast as far as Mata point, and in front of Manglito beach it is about $1\frac{1}{2}$ cables off. There is a small opening through it in front of the middle of the beach of Barigua, with $3\frac{3}{4}$ fathoms water, black sand, and $1\frac{3}{4}$ fathoms somewhat more within; and another opening in front of Manglito beach only a few yards wide and $4\frac{1}{2}$ fathoms deep, coarse sand. From Silencio point to Mata point there is no bottom at 90 fathoms, a mile from the land. From the break at the river Yumuri the high mountain covered with trees ranges near the coast to the head of port Mata.

Port Mata* is a small basin about half a mile in diameter, and only fit for coasters. There are only 15 feet water in a space of about $1\frac{1}{2}$ cables in the centre of the port, and being open to the north and north-east, it is scarcely safe in the winter months. The entrance is less than 2 cables wide, with a depth of from 6 to 4 fathoms, and a vessel in entering should steer in mid-channel, or rather on the weather shore.

To enter the port is easy with the sea breeze; but to quit it the land wind is necessary, which blows every night, and tolerably fresh at daylight.

Tide.—It is high water, full and change, at port Mata, at 6h. 49m.; and the rise is about 2 feet.

Supplies.—Small supplies may be obtained, and good water from a little rivulet on its eastern shore. Firewood is abundant.

Port Boma.†—From port Mata the shore trends N.W. by W. $1\frac{1}{2}$ miles to the entrance of the river Boma; the first part for about half a mile is of sand, and the other part of soboruco. The mouth of this river for three-quarters of a mile is about a cable in breadth, and the shore within for 4 cables is of rock; farther in it forms two bays, and becomes marshy with mangroves as far as a small channel which is scarcely fit for a

* See Admiralty plan :—Port Mata, No. 435; scale, $m = 4.9$ inches.

† See Admiralty plan :—Port Boma, No. 435; scale, $m = 4.9$ inches.

boat. At the middle of the entrance there are $5\frac{1}{2}$ fathoms water, sand, which diminishes to 2 fathoms at 2 cables within, and then to one fathom, sand, mud, or rock. The port is thus capable of receiving small vessels, which load with fruit. It is open to the northward, and fresh breezes send in rather a heavy sea. A vessel should have the land wind in leaving, and care should be taken not to drift on the coast to leeward. Water may be obtained.

Majana Point.—From Boma, the coast of soboruco forming some slight indentations, trends to the N.W. $2\frac{1}{2}$ miles to Majana point, which has two large detached rocks on it. About a cable westward of Boma, there is a white spot which is seen at some distance and useful in recognizing the port; about three-quarters of a mile farther on there is also a small opening in the soboruco with very white sand in its interior, named Caningüin; and about half-way between this and Majana point lie some large detached rocks called Herrera.

Miel Anchorage.*—From Majana point the coast trends westward for a mile to Rama point, and then southward forming a rounded headland, and the points of Guanál, Hondito, and Playuela; from the latter it runs straight to the south of the mouth of the river Miel; here the rocky coast ceases, and the Miel beach follows, extending west for a mile to the foot of fort Matachin, of the town of Baracoa. At the western extremity of Miel beach, the coast is again formed of rock (above it stands the town of Baracoa), which extends $6\frac{1}{2}$ cables N.W. by N. to Doña Dolores point, when it trends more westward to Barlovento, the weather point of port Baracoa.

Between Rama and Barlovento points is a bay about three-quarters of a mile in breadth, and somewhat sheltered from easterly winds. When half a mile westward of Rama point, steer to the southward until the mouth of the river Miel bears about S.E. by E. $\frac{1}{2}$ E., and then anchor in 5 or $5\frac{1}{2}$ fathoms water, black sand, 2 cables from the weather shore, which is of rock, and about the same distance from the beach; this is the most convenient berth. This anchorage is open to northerly winds. It is frequented for the purpose of communicating with Baracoa, if not wishing to go there. The river runs for a long distance parallel to the beach and very near it; water may be obtained a short distance from its mouth at low tide.

Port Baracoa† may be readily found by the Yunque de Baracoa or Anvil, which rises above the neighbouring heights westward of it. The entrance of the port is $1\frac{1}{2}$ cables wide, and within it opens out to 6 cables in a N.W. and S.E. direction, and 3 cables in breadth, but its shores

* See Admiralty plan :—Miel anchorage, No. 435; scale, $m = 4.9$ inches.

† See Admiralty plan : Port Baracoa, No. 435; scale, $m = 4.9$ inches.

are bordered by a sand-bank, which considerably contracts the anchorage. About 35 yards to the north-west of the inner point on the south-east side of entrance, is an isolated rock called the Buren, which uncovers at low tide; the sea always breaks on it, it is steep-to, and the only danger.

There are from 5 to 6 fathoms water in the port, but it is exposed to the prevailing winds, which throw in a heavy sea, and it is seldom visited but by coasters, and these anchor close up to the town in 3 to 5 fathoms water, mud and sand. It can only be left, except in a small vessel, with the land wind; consequently, in the season of the northers, a sailing vessel will be liable to some days' detention. The bottom in general is loose, and during fresh northerly winds the port offers but little shelter.

From March to September squalls from south to south-west are experienced, but the most violent are in July and August. These squalls are of short duration, but a vessel should ride by a fair scope of cable. Remittent fever is at times prevalent at Baracoa, and it should be avoided during the summer months.

LIGHT.—About three-quarters of a cable E.S.E. of Barlovento point, a *fixed* white light, 48 feet above the sea, is shown from an iron column, 29 feet high, above the keeper's dwelling, and may be seen 12 miles.

Supplies.—Near the pier the river Macaguanigua runs into the sea, where water may be obtained. Fresh meat is not easily procured. Large quantities of fruit are exported to the Bahamas and United States.

Tides.—It is high water, full and change, at Baracoa, at 7h. 23m., and the rise is about $2\frac{1}{4}$ feet.

Pilots for the old Bahama channel may generally be got at Baracoa.

The Coast between the ports of Mata and Baracoa is backed by high land very near it; mount Majuyara, the most remarkable eastward of Miel beach, is 530 feet high, and may be seen 24 miles. The two hills of Santa Teresa rise southward of the mouth of the river Miel; the eastern one is 687 feet, and is seen 30 miles; and the western one is 487 feet high, and seen 24 miles.

Between Mata and Boma, 6 cables from the shore, the soundings are from 28 to 64 fathoms, mud, sand, gravel, or rock; but a little more than a mile off, the depth is more than 92 fathoms. From Boma to Rama point and off the coast of Baracoa there is no bottom with 92 fathoms, at 4 cables from the land, nor at Majana point at the distance of $1\frac{1}{2}$ cables. From port Mata a reef skirts the shore westward for 4 cables, $1\frac{1}{2}$ cables off, on which the sea breaks; thence the coast as far as Baracoa is clear of danger.

Winds and Currents.—All this part of the coast, from cape Maysi to Baracoa, is exposed during the winter months to the north and north-east winds, which prevail at this season. During the summer, squalls off the land are experienced. The land winds are regular, and spring up fresh generally at daylight, but do not extend far from the coast.

The direction of the current to a short distance from the land is westward with the flood tide, and eastward with the ebb.

Yunque de Baracoa.—Nearly 4 miles W. by S. from the entrance to Baracoa, this remarkable isolated steep and flat-topped mountain rises to 1,824 feet above the sea, and may be seen 40 miles. It is partly covered with vegetation, and there are some white and red spots in the rock of which it is composed, visible at some distance. It is a most useful landmark, and its shape resembling an anvil prevents its being mistaken for any other mountain.

The Coast from Baracoa trends about N.W. $\frac{3}{4}$ N. 9 miles to Bay or Vacz point, forming first a headland of soboruco, somewhat salient for about a mile, and the points of Camello, Cerro, and Duaba, the latter terminating in a long point, and $1\frac{1}{2}$ cables from it the river of the same name runs into the sea. Then follows Duaba beach, 6 cables in length, forming a bay near the mouth of the river, which is generally about 16 yards wide, increasing to 90 yards in the rainy season; it runs parallel to the shore to the end of the beach, and then turns suddenly to the S.S.E.; the point here is named Jibaracon, where the river forms an opening during heavy rains.

Next to Duaba point the Toar beach runs in a straight line more than a mile to the mouth of the river of the same name, which is about 10 yards wide, but increases during rains; it forms a lagoon with several islets. Then Canas beach, a mile long, ends at Canas point, which is the beginning of the rocky coast of the same name. From this point, round, somewhat salient, and known by a large palm tree and a house over it, the coast of Canas and Sigua for more than a mile is of soboruco, which terminates at *Sigua, a small bay about 2 cables in extent, only used by very small vessels in fine weather. From Sigua the rocky coast trends westward for half a mile, forming Maravi point, as far as the entrance to the port of that name.

Water may be easily obtained from the river Duaba; small vessels can anchor near it, in the bight of the rocky coast formed by Duaba point.

* See Admiralty plan :—Port Sigua, No. 435; scale, $m = 1.9$ inches.

Port Maravi* is 3 cables in length in a N.E. and S.W. direction, $1\frac{1}{2}$ cables in breadth, and its entrance a cable across; its shores are of soboruco, but on the westt here are three small sandy beaches. At the head of the port the land is marshy, with mangroves, and here the river of the same name empties itself. A bank of sand, gravel, and rock borders the shore, contracts the entrance to about half a cable, and the anchorage to three-quarters of a cable in breadth. Therefore, although the water is deep, there being from 9 to 15 fathoms, mud and rock, the port is only fit for small vessels, and in entering the eye will be the best guide. A sailing vessel should leave with the land wind in the morning. This port is, however, exposed to the north-east, and not a safe anchorage except under favourable circumstances.

Supplies.—Water may be had from the river, but it is very shallow near its mouth, and dry at low tide. Wood and small supplies of provisions may be obtained.

Tides.—It is high water, full and change, at Maravi, at 7h. 56m.; and the rise is about $2\frac{1}{2}$ feet.

Port Cueva.†—About a mile north-west of port Maravi is that of Cueva, and between is the little port of Aguacate, and the two bays of cay Güin, thus called from some conspicuous houses of that name seen on the coast. This port is merely an inlet of little more than 2 cables, forming an elbow at its extremity with a sandy shore, in the western part of which the river of the same name empties itself. About half-way in from the entrance to the elbow, the breadth is only about half a cable, the shore on either side is of soboruco, and in the middle of the channel the depth is from 9 to $1\frac{3}{4}$ fathoms, with shallow water on either side; it can only be used by small vessels.

Bay† or Vaez Point.—Close westward of Cueva is the inlet of Bay, and then for nearly half a mile the coast is low and rocky, terminating in Bay point, which is rather low and almost separated from the coast, having on its lee side an inlet fit for boats. This point is often named Vaez, but the pilots and seamen of the coasters call it Bay.

The Coast from Baracoa to Bay point is backed by high land covered with vegetation to very near the shore. Between Baracoa and Duaba point, the hill of Jaitecico rises about 3 cables inland, is about half a mile in extent, of little elevation, covered with trees, and is useful as a mark. There are 92 fathoms water, about half a mile from the coast,

* See Admiralty plan :—Port Maravi, No. 435; scale, $m = 4\cdot9$ inches.

† See Admiralty plans on Sheet 435, scale $m = 4\cdot9$ inches :—Plans of Port Cueva, Port Bay.

and 13 to 23 fathoms, sand and rock, 2 cables from it; except off Duaba and Toar beaches, where there are 92 fathoms three-quarters of a mile off shore, and 14 to 46 fathoms at half a mile.

Port Navas.*—From Bay point the coast trends about N.W. by W. 8 miles to Jaragua point. Nearly a mile from the former is Naguarage* bay, fit only for boats, and the river of the same name runs into it; thence the rocky coast of Navas, with slight indentations, continues for a mile; and about half-way is a salient point named Plata, on the weather side of which there is a small white beach and soboruco above it, by which the point is known. About half a mile beyond this is port Navas, of circular form, 2 cables in diameter, with 5 to 10 fathoms, water, and which affords shelter from the prevailing winds; its mouth is a cable wide, open to the north, and there is no difficulty in entering.

Port Cayaguaneque.*—From Navas the rocky coast with three small sandy bays, named cay Santo, runs W.N.W. for about a mile to port Cayaguaneque, which is only fit for very small vessels; the channel at its entrance is about 50 yards wide.

Mapurisi Point.—From port Cayaguaneque the coast is of rock for three-quarters of a mile to Maburisi point, which has two small sandy bays on its eastern side; thence for the space of a mile, as far as Nibujon point, are five small sandy bays and a small opening called Seguro. To the westward of Nibujon point is the beach of the same name, 2 cables in length, and above it several houses and cottages, and at its western end the river runs into the sea, the water of which is good for drinking. Then follows the rocky coast called Taco for about nine-tenths of a mile, and then the beach of the same name, for $4\frac{1}{2}$ cables, which is of rock covered with white sand, and which terminates at the entrance to port Taco. At the west end of the beach, near the east point of entrance, are some houses.

Port Taco† is well sheltered, 8 cables in length north and south, and 4 cables in breadth. Its shores are bordered by a bank, which also extends along both sides of entrance to the coast-bank outside. The channel at the entrance, which is a little more than a cable long, is thus tortuous and narrowed to about 68 yards in breadth; and the principal anchorage to a space of $2\frac{3}{4}$ cables in a N.E. and S.W. direction, and $1\frac{3}{4}$ cables in breadth. The port is therefore difficult and dangerous to enter in a vessel of more than 11 feet draught, although there are $6\frac{1}{2}$ fathoms

* See Admiralty plans on sheet No. 435, scale $m = 4.9$ inches: Plans of port Navas, port Naguarage and port Cayaguaneque.

† See Admiralty plan: Port Taco, No. 435, $m = 4.9$ inches.

water at the anchorage, as with a fresh breeze the sea breaks against the rocky shore on the lee side of entrance with much force.

It will be prudent for a stranger to take a pilot for port Taco; but if unable to obtain one, and in case of necessity, bring the outer of the western points of entrance to bear W. by S. $\frac{1}{4}$ S. distant 2 cables, and then steer for the inner point, which is high, steep, and conspicuous; when three-quarters of a cable from it, steer about W.S.W. for three-quarters of a cable; and then about S.S.W., keeping about one-third the distance across from the lee shore, till within the harbour, when anchor as convenient. The edges of the bank are difficult to be seen until close to them. A vessel must have the land wind to leave.

Supplies.—Water, wood, and small supplies of provisions may be obtained.

Tides.—It is high water, full and change, at port Taco, at 8h. 49m., and the rise is about $2\frac{3}{4}$ feet.

Jaragua Point.—The coast for 2 cables westward of Taco is of rock, then the beach of Jaragua for a long half mile follows, when the coast is of soboruco and forms Jaragua point extending 2 cables from the reach. From the west point of entrance to Taco a reef skirts the coast, which terminates at this point, and is about three-quarters of a cable wide.

Maguana Reef, begins $1\frac{1}{2}$ cables westward of Vaez or Bay point, and ends about midway between Naguarage bay and Plata point. Its greatest breadth is about a quarter of a mile, which is in front of the eastern point of Naguarage bay. The reef has two openings; that eastward of Maguana is only fit for boats or very small vessels, between the eastern extremity of the reef and the coast, and it should not be attempted when there is a high sea.

The other opening is in the widest part of the reef, and a quarter of a cable in breadth. The entrance lies 2 cables N. by E. $\frac{1}{2}$ E. from the eastern point of Naguarage bay. In the channel within the reef the bottom is sand, with depths of $4\frac{1}{2}$ to 10 fathoms, and which affords good anchorage for small vessels requiring shelter. In order to reach it, skirt the reef by the eye until at the opening, when steer to the southward for about a cable in mid-channel, and haul to windward for the middle of that part of the coast of Naguarage which separates the entrance of the bay from the beach of Maguana, and anchor in $1\frac{3}{4}$ to $3\frac{3}{4}$ fathoms water, sand. This opening divides the reef into two parts, and a vessel may anchor within on either side, in one or 2 fathoms, sand.

On this part of the coast, about three-quarters of a mile from the land, there are more than 92 fathoms water; four cables off there are 14 to 30

fathoms, sand, gravel, or rock ; the most salient points of the bank of soundings correspond with the reefs of Magueana and Jaragua, and the point of Mapurisi ; about 4 cables off this point there are 10 fathoms water over rock.

Saddle of Bay.—All this part of the coast is thickly wooded, as is the high land a short distance in the interior. Among the various heights the saddle of Bay rises 1,400 feet above the sea, nearly 3 miles S.W. by W. of Vaez point ; its summit forms a saddle or two peaks, and can be seen 42 miles.

Port Jaragua.*—From Taco the coast trends W.N.W. to Jaragua point, where a reef extends north-west for two miles, and should be carefully avoided. To leeward of the point there is a deep channel more than a cable wide, shown by the breakers on either side, which leads to somewhat sheltered anchorage under the lee of the reef ; its entrance lies 2 cables north-east of three small cays. In case of great necessity a vessel may venture to run through, by bringing the east end of the largest and southernmost of these cays to bear S.W., and anchoring when about abreast the middle cay in $5\frac{1}{2}$ fathoms water, sandy bottom. Southward of this the depths diminish to 3 and 2 fathoms. The bottom is mud, and small vessels may go farther in.

The Coast from Jaragua trends first about W.N.W. and then North, forming a bay, as far as Mangle point, which is 7 miles from the former. The reef, which begins at Jaragua, skirts the whole of this bay, extending 2 miles off shore. South of Mangle point are Yamanigue† and Cañete anchorages, which are entered through two breaks in the reef, for which the best guide will be the plan, but they are fit only for small craft. At night or in hazy weather, it is necessary to be cautious in passing this reef. From Mangle point the coast runs W.N.W. for 7 miles to the river Moa, and is skirted by a reef at the distance of $1\frac{1}{2}$ to 2 miles. The river Moa is one of the largest in Cuba ; it is shallow, and only 30 yards wide at the entrance, but deepens within. Half a mile up the mangrove swamp terminates, and well wooded rising land begins, and a little beyond there is a fall of more than 300 feet. About 12 miles inland the Moa range rises to considerable height, and is a good guide for this part of the coast.

Port Cayo Moa.‡—To the north-west of the mouth of the river, about $1\frac{1}{2}$ miles from the land, and half a mile within the outer edge

* See Admiralty plan :—Port Jaragua, No. 433, scale $m = 5\cdot6$ inches.

† See Admiralty plan, No. 433, scale $m = 2\cdot8$ inches :—Yamanigue and Cañete anchorages.

‡ See Admiralty plan :—Port Cayo Moa, No. 433, scale $m = 2\cdot8$ inches.

of the reef, are the Moa cays, a group of islets nearly joined, under shelter of which there is good anchorage. The opening is 2 cables in breadth from a depth of 3 fathoms on either side, about a mile eastward of the cays and almost north of the river. The eastern or weather reef at the entrance is distinctly marked, even in fine weather, by broken water, and the rocks are rather above water than awash. But the reef on the western side does not break till about 4 cables within its eastern edge. The general body of the shoal extending from the Moa cays is coral covered with dark weed, which, even with 9 feet water over it, looks deep; but the south-east end of it is white sand, and the bottom can be seen.

Directions.—Proceeding for this anchorage, keep the eastern reef about half a cable distant, or nearer if necessary, as it may be safely approached to 30 yards, at which distance there will be from 7 to 9 fathoms water, and the dangers are visible. The course in will be S. by W. $\frac{1}{4}$ W. until the south-east point of Moa cay bears W. $\frac{1}{2}$ N.; then steer W. $\frac{1}{2}$ S., and anchor in 9 or 10 fathoms water, about $1\frac{1}{2}$ cables southward of Moa cay reef. Be careful to avoid a shallow patch with $1\frac{1}{4}$ fathoms water on it, lying mid-way between the cay and the main land, with the eastern extreme of the cay bearing N. by E. $\frac{1}{4}$ E.

Tides.—It is high water, full and change, at about 7h. 0m.; and the rise is about 3 feet. The flood stream at the eastern end of Moa cay reef sets to the south-west a mile an hour, and the ebb to the northward.

Port Yaguaneque.*—From port Moa the shore trends westward 10 miles to Yaguaneque, and the reef between extends off for 2 to 3 miles. About 6 miles to leeward of Moa, a mile within the edge of the reef, is Burro cay, and 3 miles farther on, about a quarter of a mile from the shore, is Arena or Sand cay. The entrance to the port is through a small opening in the reef two-thirds of a mile to the south-west of the latter cay; but being so narrow and intricate, and the interior merely a shallow lagoon, it is only fit for small coasters.

Cananova,† $1\frac{1}{2}$ miles westward of Yaguaneque, is a small narrow inlet of similar character, and is entered through an intricate opening in the reef north of it, which is here only half a mile from the shore.

Port Cebollas,‡ 4 miles farther westward, is equally difficult of access, and only fit for coasters. The shore is low and sandy, and the reef about half a mile distant.

* See Admiralty plans :—Port Yaguaneque, No. 432, scale $m=4\cdot8$ inches; † Cananova, No. 431, scale $m=4$ inches; ‡ Cebollas, No. 430, scale $m=3$ inches.

Tánamo.*—From Cebollas the low sandy shore continues westward 9 miles to port Tánamo, and is again foul to the distance of a mile. Mid-way between is the mouth of the river Sagua. This port is of considerable extent, and studded with small islets, between which are deep channels. The cut through the reef and the channel into the port are, however, both very narrow: but the dangers are easily seen, and the eye will be the best guide.

Cabonico and Livisa.†—From Tánamo a low sandy shore, still bordered by a reef to the distance of about 2 miles, trends westerly for 9 miles to the entrance of the ports of Cabonico and Livisa. These ports are entered through a narrow deep channel about a cable wide. About half a mile within the entrance a narrow neck of land divides the interior into two channels; the easternmost leading into Cabonico, the other into Livisa. Both are very tortuous and intricate, but have sufficient water for vessels of large draught. Most of the dangers are seen, and the eye will guide in mid-channel.

Port Nipe.‡—From the entrance to Cabonico the coast trends W.N.W. 5 miles to port Nipe. In this space the reef skirts the shore at about a mile until close to the entrance to Nipe, where it extends off only a quarter of a mile. Port Nipe is about 9 miles in extent east and west, and from 3 to 7 miles in breadth. It is quite secure against all winds, and will admit vessels of the largest draught without difficulty. The entrance is from a quarter to three-quarters of a mile wide, and all that is necessary in entering is to steer in mid-channel; the tides run very strong in the narrows. After passing the inner points of the entrance, keep the northern shore aboard until within Mangle point, from which a shoal extends to the N.N.E. three-quarters of a mile, when anchor as most convenient, in 6 to 9 fathoms water; the edges of the shoals are marked by stakes.

A sailing vessel will have to wait for the land wind to take her out, which, as before stated, in the winter season is frequently interrupted by northers for some days.

Mount Sama.—The land in this neighbourhood is remarkable. About 10 miles inland the Christal range, a continuation of the Baracoa chain, rises to a great height. To the north-west of port Nipe there is also a lofty ridge of mountains rising from the shore at Mulas point to the peak of Sama, a hill of rounded form, 885 feet above the sea, with some long table-land close to the westward, and a peaked hill to the east of it; it

* See Admiralty plans:—Tánamo, No. 429, scale $m=2\cdot2$ inches; † Cabonico and Livisa, No. 428, $m=1\cdot1$ inches; ‡ Port Nipe, No. 427, scale $m=0\cdot8$ of an inch.

cannot well be mistaken, and may be seen 20 miles. The two ranges are separated by an extensive valley, which also serves as a good guide.

Port Banés.*—From the entrance to Nipe a bold and steep coast trends to the N.N.W. and N.W. for 9 miles to this harbour, which is also well sheltered, and of sufficient depth for large vessels. Its entrance, however, lies at the bottom of a bay or funnel, 2 miles wide in the outward part, and completely exposed to the usual trade wind. The channel into the port, narrows to $1\frac{1}{2}$ cables, and the turnings are so sharp that it is very difficult pilotage. In leaving, make sure of a good offing before the land wind fails, as the vessel will be on a dangerous lee shore and exposed to a heavy sea and lee current.

Lucrecia Point.—From Canones point the shore runs in a N.N.E. direction 6 miles to point Mulas, and is foul nearly a mile off. Thence it trends N.N.W. 4 miles to Manglito point, and then about N.W. for 2 miles to the east point of Larga beach, on which stands Lucrecia lighthouse. The point of this latter name is about half a mile westward, and the land here rises by degrees from the sea to a height of about 200 feet a mile inland. From abreast Manglito point a reef skirts the shore for $1\frac{1}{2}$ miles westward at a distance of a cable. From the lighthouse the shore trends nearly west for $1\frac{1}{2}$ miles to Gorda point, forming various points a little salient; this part of the coast is called Larga beach, and it is bordered by a reef which extends northward a quarter of a mile. Between Manglito and Gorda points the shore is low and mostly of soboruco, with some parts covered with sand; a short distance from the sea, mangroves and trees are seen, and the coast appears somewhat higher than it really is.

LIGHT.—The tower near Lucrecia point is white, and exhibits, 112 feet above the sea, a *red* light, *revolving every minute*, which may be seen 15 miles.

Port Sama.†—From Gorda point the coast trends about N.W. by W. 6 miles to Sama point, which is $3\frac{1}{2}$ miles eastward of the port of the same name. All this part of the shore is clean and steep-to, and about midway is the small river Seco, at the head of a sandy bay. Port Sama is a small inlet about $1\frac{1}{2}$ miles long, north and south, from one to 2 cables wide, and only fit for vessels drawing not more than 11 feet water. The entrance may be readily found by mount Sama, which rises south of it. To the westward of the port there is also the table-land or flat-topped ridge of mountains running N.W. and S.E., and its west end is bold, scarped, and of a whitish appearance.

* See Admiralty plan :—Port Banés, No. 426 ; scale, $m = 1 \cdot 1$ inches.

† See Admiralty plan :—Port Sama, No. 425 ; scale, $m = 6 \cdot 5$ inches.

Port Naranjo.*—Between Sama and Naranjo, 5 miles westward, the shore is composed of sand, and named Guarda-la-vaca. To the southward of it there is a detached sugar-loaf hill, and to the south-west the table of Naranjo, a small wooded mountain with a flat summit. Naranjo lies between these two objects, and about 3 miles to windward of it there is a remarkable red cliff, and on the east side of the entrance there is also another of the same appearance, high and scarped. The shore between it and Sama is foul to the distance of about half a mile. The entrance to the port is only a cable wide; but it opens out into an irregular-shaped basin, containing several inlets deep enough for vessels of all classes sheltered from all winds, and they can sail in or out of it with the usual sea breeze.

In entering this port, a berth should be given to the reef skirting the weather coast until the eastern point of entrance bears S. $\frac{1}{2}$ E.; then steer in, giving the point a berth of a cable to avoid the shallow sand-bank which surrounds it at a distance of three-quarters of a cable. Care should also be taken to guard against the sand-bank bordering the lee side of entrance, and which extends northward $1\frac{3}{4}$ cables from the outer scarped point. Having passed through the middle of the channel by the eye, anchor about three-quarters of a cable off a marshy and mangrove shore on the eastern side, in 9 fathoms water; or proceed farther up into what the fishermen call the Carénage or western bight. The best berth here will be in about 8 fathoms, with the centre of the table of Naranjo W.S.W., and the north point of the Carénage in one with the red cliff at the entrance, about North. The table of Naranjo from this quarter has a conical appearance.

Wood and Water.—There is good wooding and watering; the latter a stream on the southern shore at the head of the Carénage, abreast the table of Naranjo; but there will be some difficulty in finding the opening in the bushes leading to it.

Tide.—The rise of tide at port Naranjo is $3\frac{1}{2}$ feet.

Port Vita.†—From the entrance to port Naranjo the shore trends W.N.W. 2 miles to Pesquero-nuevo point, which is scarped and clear of danger, and then S.W. 3 miles to port Vita. This part of the coast is low, sandy, clean and steep-to. Vita is a small, narrow, irregular-shaped inlet, which may be used and easily piloted by vessels drawing under 18 feet.

Port Bariay.‡—Three miles westward of Vita is Bariay, and a mile farther Jururu; the shore between is clear of danger. Port

* See Admiralty plans:—Port Naranjo, No. 424, scale $m=3\cdot4$ inches; † port Vita, No. 423, scale $m=6$ inches; ‡ port Bariay, No. 422, scale $m=3\cdot9$ inches.

Bariay, is open to the northward, and therefore not safe in the winter months; but there is good temporary anchorage close under the weather shore off the second sandy beach from the entrance.

Port Jururu* is more extensive than that of Bariay, and the interior completely sheltered, with a depth of 4 fathoms; but the entrance is narrow, rather tortuous, and only fit for small fore-and-aft rigged vessels of light draught.

Port Gibara.†—From Jururu the coast continues westward clear of danger 5 miles to Gibara, which is merely a small bay about a mile in extent, with a depth, just within the entrance points, of 20 feet. It is quite open to the northward, and only fit for small coasters, which find shelter with the wind as far round as N. by W. close under the weather shore. The town stands on the western shore, and may be seen 9 miles off. To the southward of it are three remarkable hills; the easternmost, from the shape of its summit, is called the saddle of Gibara; the middle one somewhat resembles a sugar-loaf; and to the westward of the other are some hills of regular height.

Although the bay is only adapted for small vessels, it is the port of Holguin, a large town about 15 miles in the interior, in a highly cultivated part of the country. The river Gibara flows into the bay, and is navigable for boats some distance up.

The Coast from the western point of Gibara bay takes a northerly direction for 2 miles to Brava point, and is bold and rocky. It then bends round about N.W. for 7 miles to Gorda point, and $5\frac{1}{2}$ miles farther is Mangle point. The shore is rocky, sloping, and clean to Mangle point, but it then becomes sandy and steep-to, as far as the eastern point of Herradura bay, 7 miles to the W.N.W. where coasters drawing 10 feet draught find anchorage, but it is open to the Northward. Thence it takes a more westerly direction for 7 miles to port Padre. This latter part is low and foul to some distance; on the shore are many remarkable palm trees.

Port Padre‡ is a secure basin, carrying a depth of 4 fathoms over the greater part of it; the channel into it, however, is long, somewhat tortuous, and only 2 cables in breadth, but there are no dangers. Close to the westward of the port are two small hummocks, which are good guides for it. The entrance lies at the bottom of a bay which is about a mile deep, and at the outer part, between Jarro and Guinchos points, 2 miles wide. Close off the latter there is a small cay, and this side is steep-to. All, therefore, that is required in entering is to give the

* See Admiralty plans:—Port Jururu, No. 421, scale $m=7\cdot6$ inches; † port Gibara, No. 420, scale $m=3\cdot6$ inches; ‡ port Padre, No. 419, scale $m=0\cdot8$ of an inch.

reef which skirts the eastern coast a berth until Jarrow point bears S.E., when haul in, keeping the western shore aboard. The interior of the port is almost separated into two parts; the easternmost will be found the most convenient for leaving, and the channel into it is between the two cays at the inner end of the entrance channel. Five perches mark the channel into the western branch of port Padre after passing ponit Gracia, one on the N.W. end of cay Puercos, one off the N.W. end of cay Juan Claro,—these are to be left on the port hand; and three on the shoal between Puercos cove and Morena point, to be left on the starboard hand. There is also a beacon surmounted by a ball, and painted green and white, on a shoal named Esteron in the harbour.

Malagueta.—The shore from port Padre continues its westerly direction for 5 miles to Piedra point, where there is a small opening leading into Malagueta inlet, an extensive unnavigable lagoon. The land around is low and swampy. From thence the coast takes a N.N.W. direction $3\frac{1}{2}$ miles to Cobarrubias point, and then W.N.W. 7 miles to port Manati. All this coast is skirted by a reef to the distance of about 2 miles.

Port Manati* carries a depth of from $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms; but it is merely a long narrow tortuous channel, bordered by banks on either side, leading into a shallow lagoon, surrounded by low marshy land, and only fit for coasters. On its western side there is a remarkable sugar-loaf hill called Mañueco, and a little beyond it another, not quite so lofty, named Pardo of Manati, which may be seen 15 or 20 miles, and are good guides from the offing. It must be borne in mind, however, that when nearly in line they somewhat resemble the saddle of Gibara, and, if mistaken for it, might lead to accident.

Port Nuevas Grandes.†—From Manati the coast trends about N.W. 2 miles to Braba point, and then N.W. by W. $4\frac{1}{2}$ miles to the entrance of Nuevas Grandes, which is merely a small tortuous inlet, in some parts only half a cable wide, and only navigable for vessels under 12 feet draught. All this part of the shore is foul, and the reef extends off about two-thirds of a mile from the entrance of the inlet, through which a channel is formed leading to the port.

PORT NUEVITAS del PRINCIPE.‡—From Nuevas Grandes the coast takes a N.W. direction for 13 miles to Nuevas del Principe, is skirted by a reef all the way, and should not be approached within $2\frac{1}{2}$ miles. H.M.S. *Plover* found discoloured water 10 to 12 miles

* See Admiralty plans :—Port Manati, No. 418, scale $m=1.1$ inches; † port Nuevas Grandes, No. 417, scale $m=1.8$ inches; ‡ Nuevas del Principe, No. 416, scale $m=0.7$ of an inch, with enlarged plan of entrance.

off this port. Nuevitas is the port of Principe, a large commercial town about 26 miles in the interior, and which communicates with it by a single line of railway. The harbour is completely sheltered, and capable of admitting vessels of large draught; but the channel into the interior is long, so narrow, and its turnings so sharp, that for a heavy ship a pilot is absolutely necessary; in his absence it must be navigated by the eye as all dangers can be seen. In this case, being well under command, steer in with the lighthouse bearing South; as the entrance is approached, keep a mid-channel course, giving a berth to the reefs, marked by stakes, that extend off the entrance points. The tides run strong at the entrance, but they are scarcely sensible in the harbour; eddies should be guarded against. In 1883 there were ten perches or stakes placed on the projecting points and reefs. Five were black, and five red—the black ones to be left on the port hand, and red on starboard hand, but they are liable to be washed away by the strong tides, and therefore not to be depended upon.

The entrance points are low and about half a mile apart; on the eastern points are some huts, the residences of pilots, and near them a flag-staff. Near the south shore of the harbour are three small hills, and in the middle three small islets, somewhat higher than the surrounding land, and good guides from the offing. Should a vessel merely wish to communicate with the town, it will be found convenient to anchor off the fort, which is about $1\frac{1}{4}$ miles within the entrance.

Supplies.—There is a small stream of good water near the town of Nuevitas, on the western shore of the harbour, but it is difficult to get at, as the mouth is nearly dry. Coal can be obtained at times.

LIGHT.—On the east side of the entrance, is a quadrangular building painted yellow, and a white mast stands in the middle of it, from which is exhibited, 49 feet above the sea, a *fixed* white light, visible 9 miles.

Maternillos Point.—This part of the coast is also pointed out by the lighthouse on Maternillos point, which bears about N.W. by N. 4 miles from the entrance to Nuevitas. The coast between is very low, but free of danger. From Maternillos point as far westward as Yeacos point, a space of nearly 250 miles, the coast is bordered with low mangrove cays and reefs to the distance in some places of 20 miles from the mainland. The greater part, to the westward of Paredon point, is but imperfectly represented on the charts, and being studded with dangers, steep-to, should be most cautiously approached.*

* The edge of the bank between Maternillos point and Paredon Grande, 75 miles, was minutely surveyed by Mr. John Parsons, Master, R.N., commanding H.M.S. *Scorpion*, 1854.

— **LIGHT.**—The lighthouse on Maternillos point is 170 feet high, white, with the word Colon painted on it, and exhibits, 173 feet above the sea, a *revolving* white light, attaining its greatest brilliancy every *minute*, thus becoming like a fixed and flashing light, and visible 23 miles.

The Coast from Maternillos point trends N.W. by W. about 19 miles to the boca of Caravelas. This part of the coast is called the Sabinal, it is very low, with a sandy shore, backed by numerous lagoons and swamps, and skirted by a broken reef to the distance of from one to $1\frac{1}{2}$ miles, with soundings about one-third of a mile outside it. Between this reef and the coast there are anchorages for vessels whose draught does not exceed 9 feet, such as Tortuguilla, Cruces, and Caravelas, where there is shelter from the ordinary winds, but not from the northward. These anchorages are entered through openings in the reef, which are shown by the sea breaking, and a vessel may steer in by the eye, and lead, and anchor, when sheltered, as convenient.*

The only remarkable object on this coast is a large clump of high mangrove trees, about 10 miles from Maternillos point, almost close to which lies a small cay 30 feet high.

Boca de Caravelas has one fathom over its bar, and the same depth may be carried through an intricate channel between the mangrove cays, to the fishing village of Guaja, about 17 miles to the westward. At the entrance of the opening the tide runs 3 knots.

Guajaba Island.—From the boca of Caravelas the north-east side of the island of Guajaba trends nearly N.W. 10 miles. For the first 4 miles it is a low mangrove shore, the remainder is a sandy beach. It is skirted by reefs at a distance of nearly 2 miles, which continue to Confites cay, forming various breaks which afford anchorages for small vessels of not more than 7 feet draught. On this island are two small hills; the south-east hill is about a mile in extent N.W. and S.E., and 90 feet high; the other is a smaller round lump, and a little less elevated. When first seen from the eastward they have the appearance of four small hummocks, and serve as guides to this part of the coast.

Boca Guajaba, which separates this island from cay Romano, has a depth of 5 feet at its entrance at low water, the tide runs 2 knots an hour, and there is a boat channel with 3 feet water up to Guanaja. About 7 miles N.N.W. of the opening there is a remarkable hill on the eastern end of Romano cay, 230 feet high, which cannot be mistaken. Under it will be seen two fishing stations near the beach. The edge of the bank is here about $1\frac{1}{2}$ miles off, and the reef a little inside it.

* See Admiralty chart :—West Indies, sheet 1, No. 1,217, scale $m = 0\cdot06$ of an inch; also No. 2,580, Cuba, Eastern portion, scale $m = 0\cdot12$ of an inch.

Cay Verde.*—About 6 miles to the northward of the above hill is a small, low islet, of circular form and a cable in diameter, covered with bushes to the height of 10 feet above high water, and inside the reef, called cay Verde. To the N. by E. of cay Guajaba there is an opening through which 10 feet water may be carried, and half a mile S.W. of cay Verde there is shelter for vessels of this draught against northers. The best channel to take is that round the north end of the reef about 2 miles from the cay, but it requires good local knowledge.

Cay Confites.†—This low cay is about half a mile in length, north and south, a cable wide, and lies close on the edge of the bank, 4 miles N. by W. of cay Verde, $4\frac{1}{2}$ miles E. by N. from the south-east end of cay Cruz, 12 miles S. by W. $\frac{1}{2}$ W. from cay Lobos, and 19 miles West of Diamond point, at the entrance of the Old Bahama channel. On its south end there is a pile of stones, and near the north end a solitary tree, which is the first object seen when coming from the south-east. Off the north end a reef extends north-west about a mile, with a small channel of water between it and the cay. A 3-fathom reef extends also a mile from the south end, part of which dries.

Anchorage.—Between this latter reef and the one extending northward of cay Verde there is a clear channel with a depth of 5 fathoms, and leading into anchorage under cay Confites in from 2 to 4 fathoms, white sand. The best sheltered berth is with the cay bearing N.E. about a mile off, or nearer, according to the vessel's draught. Observe, however, that with the wind to the southward of East, a heavy roll of the sea sets in round the south end of the cay. This is the only anchorage on this side of the Bahama channel between Nuevitas and Paredon Grande cay, where a vessel drawing more than 12 feet can ride out a norther in safety.

In quitting this anchorage, if the wind prevents leaving by the south-east channel, steer to the N.W. until clear of the reef extending from the north end of the cay.

Cay Cruz is about $11\frac{1}{2}$ miles long in a N.W. $\frac{1}{2}$ N. and S.E. $\frac{1}{2}$ S. direction, very low and flat, with a sandy shore, and at its north-east point there is a remarkable clump of trees, 30 feet high. A mile W.N.W. of the clump of trees is a sand-bank, which is only seen when near it. The cay is divided in the centre by a small cut, and abreast it on cay Romano there is a remarkable hummock 100 feet high, called the hill of Afí. Between these two cays there is only a foot water at low tides, and the

* See Admiralty chart :—Great Bahama bank, sheet 2, No. 2,009, scale $m = 0.25$ of an inch.

† Sheet of plans, No. 2,384, cay Confites anchorage, scale $m = 1.3$ inches

bottom is like pipe clay. Within Romanó it is olive mud covered with weed.

Caiman and Anton Cays.—About 4 miles north-west of Cruz cay, lies Cayman cay, higher than others in the vicinity; and about 3 miles farther, at Sandy cay, begins a chain which extends in a N.W. by W. direction for 9 miles to Anton cay, and thence to Paredon Grande cay, all skirted by shallow banks without anything particular to recognize.

Tributarios de Minerva Reef.—About half a mile within the edge of soundings, 2 miles North of the north end of Cruz cay, and $3\frac{1}{2}$ miles E. $\frac{1}{2}$ N. of the north end of Caiman cay, lie the Tributarios de Minerva, a reef on which the sea breaks with fresh breezes, and which uncovers at low tide. In a W.N.W. direction from this reef are numerous others, with but little water on them, and near the edge of soundings. The edge of the bank between cay Confites and the Tributarios de Minerva runs N.W. $\frac{1}{2}$ W. in a straight line for $14\frac{1}{2}$ miles, and may be seen from aloft, the white sandy bottom showing itself distinctly just within the edge of the bank, which is very steep-to. This part is extremely dangerous, and should be approached very cautiously, as there is no safe anchorage whatever.

Paredon Grande Cay.—The space between Cayman and Paredon Grande bays is interrupted by low cays, sand-banks, and reefs. From the Tributarios de Minerva the edge of the bank takes about a N.W. by W. $\frac{1}{2}$ W. direction for 18 miles, when it comes within 2 miles of the north end of Paredon Grande cay, which is about 5 miles in length east and west, rocky, woody, and about 40 feet high. Guinchos (or Ginger) cay on the edge of the Bahama bank bears from the north point of Paredon Grande N. $\frac{1}{2}$ E., 16 miles.

LIGHT.—On the northern part of this cay, is an iron structure, white with a brown base, on a foundation of rock, 127 feet high, from which is exhibited a *fixed* white light, varied by a *flash every minute*, 156 feet above the sea, and visible about 19 miles.

Paredon Del Medio.—To the north-west of Paredon Grande and close to it is Paredon Chica, a round cay of regular height; and $2\frac{1}{4}$ miles West of the latter is another similar cay, 25 feet high, named Paredon del Medio. These cays afford shelter with the wind from N.E. to East for vessels of 9 feet draught, but with the wind from N.N.E. it is necessary to leave the anchorage in consequence of the heavy sea which sets in. The Paredon del Medio is foul on the north and east, and a vessel cannot pass inside it. About half-way between the two Paredons lies a bank on which the sea generally breaks.

Between Confites cay and Paredon Grande there is no anchorage, as throughout the space is full of shoals not sufficiently large to afford shelter. The bank should not be approached closely without purpose.

Water.—The only good water to be obtained at any of these cays is from a few springs or wells. In some places by digging in the sand it may be found, but is generally brackish.

Tides.—The stream of tide sets right on and off the bank about half a knot an hour, but in the openings between the cays, it runs from 2 to 3 knots. It is high water, full and change, at 7h. 30m., and the rise at springs is 3 feet. Between the cays and the main the rise is not more than a foot, and the stream is scarcely perceptible.

Coco cay.—Five miles S.W. by W. of Paredon del Medio is the north-western part of Romano cay, separated from Coco cay by a channel half a mile wide, and nearly 4 feet deep. Coco cay is of moderate height, with various sandy places on the northern part, and the southern part extends westward covered with mangroves to southward of Guillermo cay. At the northern part of Coco cay is the port of the same name, sheltered with north-easterly winds, formed by Jaula cay, and a small reef which unites it to Coco cay. This anchorage is exposed to northerly winds. Three-quarters of a mile northward of the east end of Coco cay is Queche, a small flat cay covered with mangroves. Westward of Paredon del Medio, shoals extend almost continuously to the north-east part of Coco cay.

Jaula, Guillermo, and San Felipe Cays.—Four miles westward of Coco point; is Jaula cay. W.N.W. of Jaula there are three other small cays named San Felipe, the smallest distant 4, the next 6, and the most western 7 miles. Guillermo cay lies West 6 miles from Jaula cay, and extends $5\frac{1}{2}$ miles E.S.E. and W.N.W.; its western part is of moderate height.

Media-Luna and Hijos Guillermo Cays.—About 2 miles N.W. of Guillermo is Media-luna cay, rather flat with reefs on its south and west sides. The Hijos Guillermo are three cays of small extent, surrounded by a reef, and lying $1\frac{1}{2}$ miles W.N.W. from Guillermo cay.

Westward of Media-luna cay, near the edge of the bank of soundings there are two shoals, one about 3 miles from the cay, and the other 6 miles. Vessels of 9 feet draught bound from port Coco to the anchorage of cay Francés may pass southward of San Felipe, Media-luna, the small cays of Santa Maria, and the above shoals.

Santa Maria Cays.—About W.N.W. of Media-luna cay is the chain of small cays of Santa Maria, the eastern of which is 8 miles from it, and the western 14.

Close westward of this last group is Cayman cay, south-west of which again is Santa Maria cay, which is of regular height, and extends 6 miles east and west.

From Paredon Grande, the edge of the bank takes about a W. by N. $\frac{1}{2}$ N. direction for 50 miles, and is then about 4 miles northward of Santa Maria cay. This part of the coast is very little known; it is dangerous, and affords no anchorage whatever to any but small coasters, that are well acquainted with it. The bank next trends W.S.W. 10 miles, its edge continuing nearly the same distance from the outer cays.

Cay Francés.*—About $7\frac{1}{2}$ miles W. by S. from Santa Maria cay, is the east end of cay Francés, which is of regular height and 3 miles in extent. On its north side are seen, extending east and west, three round hills, two joined together, and the third somewhat separated, which are called the nipples of Viuda. The paps of Buenavista and mount Guajabana will also be observed; the former bears about S.W. by S. from the west end of the cay, and the latter S.W. $\frac{1}{8}$ W. On the west point of the cay, which is low and rocky, are several pilot-houses. The point is surrounded by a sand-bank which extends westward, and to the south-west for nearly a mile; a mile westward of the point the depth is 5 fathoms; a *red* buoy (not to be depended upon) is placed in 6 feet water, about $1\frac{1}{2}$ cables within the southern edge of this bank.

LIGHT.—On the western end of Cay Francés is a lighthouse, from which at an elevation of 61 feet is exhibited a *fixed* white light visible 11 miles; the name of Topete is painted on the lighthouse tower.

Anchorage.—There is a good anchorage, in $3\frac{1}{2}$ fathoms water, with the prevailing easterly winds, to the southward of the sandy ledge which runs off from the west point of the cay, but observe that the water shoals quickly to the bank. In running in, keep the west end of Cobos cay S. by W. $\frac{1}{2}$ W., until the south-west end of cay Francés bears E.S.E., when haul up round the sand-bank, and anchor with the lighthouse bearing N. $\frac{3}{4}$ E., and a small white cliff on the west side of the cay E. by N.

In beating in for the anchorage, do not stand to the northward into less than $3\frac{1}{2}$ fathoms, as the bank is steep-to; to the southward towards Cobos cay, a vessel may go into 3 fathoms, the water shoaling gradually. Around the cay there is an abundance of excellent oysters.

Water.—There are some good wells at the south end of Cobos cay, and water will be found at Coco bay.

* See Admiralty sheet of plans, No. 2,384, cay Francés anchorage, scale $m = 1.3$ inches.

Port Caybarien, on the main about 15 miles from cay Francés, is the port of San Juan de los Remedios, 3 miles inland with communication by rail. The channel to this port lies between Boca Chica, where is the quarantine station, a small flat cay $4\frac{1}{2}$ miles S.W. by W. of the western part of cay Francés, and the west end of Cobos cay. Vessels drawing under 9 feet can get to the anchorage off the town of Caybarien, which contains about 1,500 inhabitants, but those of heavier draught load at cay Francés. The charge for pilotage to the former is 48 dollars, to the latter one dollar a foot; the channel with port Caybarien is marked by beacons on either hand, all red ones must be left on starboard hand and the black ones on the port hand.

Mountains.—The Cunagua range, visible more than 33 miles, and rising nearly S. by E. of the small cay of Jaula, is flat table-land, with a break in the centre, but which is difficult to be seen.

The Perros are a continuation of mountains running east and west for a moderate distance, and are seen 15 to 18 miles northward of Santa Maria cays.

The paps of Buenavista are two round hills separated by a break, which can be seen more than 24 miles: they form part of a chain of mountains of moderate elevation, running W.N.W. and E.S.E.

Mount Guajabana is small and more elevated on the east part than the west, towards which there is a declivity; it rises near the coast northward of Buenavista.

Fragoso Cay extends N.W. 22 miles from Boca Chica at its east end, and presents nothing remarkable but a small hill in the middle, named Anton, which rises before the other land of the cay, which is low. The cay is divided by two narrow channels, named Anton, but they are not navigable. On its north-east side is the Almedinas reef, and another 2 miles N.W. of the north point of the cay.

Almedinas Reef, which always breaks, lies close to the edge of the bank, N.W. by W. 9 miles from the west end of cay Francés, and E.N.E. 3 miles from Anton hill. Between the reef and Fragoso cay there is a channel with $2\frac{1}{2}$ fathoms water.

From abreast cay Francés the edge of the bank trends about N.W. by W. for 40 miles, when it comes within a mile of the Jutias cays; it then curves more westerly to the boca of Maravillas.*

Medio and Pajonal Cays.—About 2 miles W.N.W. of the west end of Fragoso cay, lies a low cay named Medio; and north-west of it

* See Admiralty chart :—Cuba, Western portion, No. 2,579, scale $m = 0.12$ of an inch.

are the Pajonals cays; between this group and Medio is the boca de Marcos, navigable only for vessels under 5 feet draught. The Pajonal cays extend about N.W. for 4 miles to Tocinera point, the north extreme of the group.

Vela and Carenero Cays.—Three miles N.W. of Tocinera point, lies a small flat cay called Vela; about 2 miles to the southward of it is Carenero, divided in two, and a mile westward of the latter is Lanzanillo, with a channel between, $1\frac{3}{4}$ fathoms deep.

Anchorage.—Vessels under 10 feet draught will find shelter from the usual winds southward of Vela cay; steer in westward of the cay, as there is no other passage. To the southward of Carenero cay there is convenient anchorage in the norther season for vessels of the above draught; steer in for this anchorage by the Lanzanillo channel, avoiding the small reefs which extend from the cays, and with the lead choose the most convenient berth.

Jutias Cays.—A group of several islets of moderate height, about 3 miles W. by N. of Vela cay, and extending 4 miles westward. From the largest of them, three small rather flat cays lie in a N.E. direction over a space of $1\frac{3}{4}$ miles, and from the outer one a broken reef extends westward 4 miles.

The Seron is one of the channels leading to the mouth of the river Sagua la Grande, and which admits vessels of about 8 feet draught, but a pilot is necessary. About a mile N.N.E. of the entrance is a bank on which the sea always breaks.

Bocas Canete and Maravillas.—About three-quarters of a mile north-west of the boca Seron, is that of Cañete, which admits vessels under 5 feet draught. Two miles farther on is the boca Maravillas, which carries nearly 15 feet water, and is much frequented.

Fradera Rock.—This rock, about half a cable in extent, with a least depth of 11 feet over it at low water, and having 22 feet close around, lies with Cristo little cay bearing N. 73° W., East point of La Cruz cay S. 1° W., and Marillanes bank buoy S. 62° E.; it is marked by a wooden beacon painted red.

Port of Sagua la Grande.*—About 2 miles N.W. of the entrance to the boca Maravillas lies Cristo cay, with the boca Ciega midway between; and 6 miles W.N.W. of the north point of this cay is the entrance to the boca Sagua la Grande. This port is considered to extend 13 miles W.N.W. and E.S.E., and 6 miles north and south. Of

* See Admiralty sheet of plans, No. 2,384, port of Sagua la Grande, scale $m = 1:45$ inches.

the several channels leading to the anchorage for loading, the only practicable one for vessels of over 8 feet draught is the boca Maravillas.

As the cays which surround the port are low, and the greater portion of them composed of mangroves, the winds cause much sea, notwithstanding the little depth. It is necessary in bad weather, and particularly in the months of September and October, to take every precaution for security. There are many beacons (piles) laid out on the projecting points and shoals, but they cannot be relied on.

The mouth of the river Sagua la Grande lies about 4 miles S.S.W. of the entrance to the boca Maravillas, and is connected with the interior by a railway. The bar is passable for vessels of 6 feet draught. The town stands about 12 miles in a direct line from the coast, but 21 miles by the windings of the river.

Directions for the Boca de Maravillas.—Vessels bound to Sagua la Grande through this channel should make Cristo cay, on the east end of which are some huts, with a flagstaff bearing a blue flag with the letter P in white, marking it the pilot station. When about a mile N.E. of the flagstaff, steer S.S.E. passing eastward of Fradera rock with beacon and westward of the iron buoy on the west edge of the Marillanes bank. The buoy is in 19 feet water, and there is as little as 6 feet water on the bank, the sea generally breaking on it. On nearing the bar, a bell buoy, in 17 feet water, marking the western sand banks, will be seen, and which should be left to the westward.

When abreast this latter buoy, alter course to S.S.W. $\frac{1}{2}$ W., which, skirting the weather reef, leads in mid-channel between the Mariposa and Cruz cays, leaving a beacon on the shoals between Palomo cays and cay Cruz on the starboard hand; then haul up and pass close westward of the buoy placed near the edge of the spit extending from the former cay; when a S. $\frac{1}{2}$ W. course may be steered, passing the next, a bell buoy, on the port hand; anchorage may now be taken up in about $2\frac{1}{2}$ fathoms water.

Leaving by this passage a vessel should take the advantage of the land wind, which blows regularly from daylight until 10 a.m., when the sea breeze sets in; the channel is too narrow for working. In case of calm or not sufficient wind, it will be necessary to anchor, the tide not setting fairly through the channels.

Boca Sagua la Grande affords a passage only for vessels of 8 feet draught, although at the entrance there are between 4 and 5 fathoms water, shoaling within. There is good anchorage in 3 fathoms about half a mile southward of Muertos point.

LIGHT.—On the north-west point of Hicacal cay, east side of the entrance to boca Sagua la Grande, a *fixed* white light is shown from a

mast above the keeper's dwelling, 55 feet above the sea, and visible 8 miles. The keeper's dwelling may be known by its red doors and windows; eastward of it there are a few fishermen's huts.

Verde Cay.—From Bushy cay, the western point of entrance to the boca Sagua la Grande, a chain of rocks, on which the sea breaks, encircles the cays as far as Verde cay, $8\frac{1}{2}$ miles to the W.N.W. Near the edge of the bank, and half a mile northward of Verde cay, is a reef, having an opening between it and another reef a mile farther westward, affording a passage for small vessels.

Medano Islet.—N.W. by W. 6 miles from Verde cay, is a small flat sandy cay, from which the Nicolao reef sweeps round from N.E. to N.W., distant from one to 3 miles, and on which the sea does not always break. About a mile S.W. of it is a shoal which uncovers at low tide, and the sea always breaks over it. This part of the coast bank is extremely dangerous, and not well known. From Médano islet, cay Sal bears N. by W., 28 miles.

To the eastward of Bahia de Cadiz cay, between it and Nicolao reef, there is a clear space on the bank with from 6 to $2\frac{1}{2}$ fathoms water. Also, immediately eastward of the Médano, there is another clear space with about the same depth of water. A vessel under 10 feet draught may navigate over this part of the bank, with the lead and look-out for shallow water from aloft.

Mountains.—About 21 miles southward of Médano islet is the Morena range, remarkable, with several pointed peaks; the mountain runs N.W. and S.E. a long distance and is of moderate height.

A short distance westward of the Morena, there is another remarkable range of lofty hills, forming three peaks, the centre one being the highest, called the Bella paps, which bears South of cay Cádiz, and is a good guide for it.

Farther westward is the Limonar range, which may also be seen from outside the shoals; and between it and the peaks of Camarioca, still farther westward, is the hill of Santa Clara, equally conspicuous.

Bahia de Cadiz Cay is about 9 miles westward of Médano islet, and on its north-east part there are some fishermen's huts and a flag-staff. Under the west side there is good anchorage with the usual winds, but it is exposed to the North. In rounding the west end, vessels drawing not more than 15 feet may bring the Bella paps to bear S. $\frac{1}{2}$ E. or S. by E., and run in upon that line until the centre of the cay bears about E. by N. $\frac{1}{2}$ N., then anchor in 4 fathoms water, sandy bottom. Vessels of heavier draught had better anchor in 5 fathoms with the centre of the cays East. In standing in the depths will be 4, $4\frac{1}{2}$, and 5 fathoms, and strangers

will probably feel alarmed at the dark appearance of the water, but the bottom is sand covered with weed. There is good fishing and wooding here, but no water.

LIGHT.—Near the north-east end of Bahia de Cádiz cay is an iron tower 159 feet high, painted white, from which is shown, 175 feet above the sea, a *revolving* white light attaining its greatest brilliancy *every minute*, and said to be visible 24 miles.

Tides.—It is high water, full and change, at cay Cádiz, at 9 h. 20 m., and the rise 3 feet.

Alcatraces Cays.—Six miles S. $\frac{1}{2}$ W. of the Médano islet is the eastern extreme of these cays, which extend W.S.W. nearly 6 miles. Between them and a chain named Falcones, extending S.W. by S. and N.E. by N., is the boca Alcatraces, where vessels of 9 feet draught will find shelter from all winds.

Cabezas Cay, 7 miles westward of Bahia de Cádiz, has a dangerous ledge running from it to the westward, and as it lies on the edge of bank, it should be approached with great caution. About midway between this cay and Bahia de Cádiz is a shoal, on which the sea does not always break. From the Cabezas cay the edge of the bank takes a W. $\frac{1}{2}$ N. direction for 17 miles to the north end of Cruz del Padre cay, which is the northernmost of the whole range. Thence the bank sweeps round to the south-west, forming a convex to the westward, and terminates off the west part of Ycacos point.

Cruz del Padre and Galindo Cays.—Five miles W.S.W. of Cabezas cay is the Pargo channel, and 3 miles farther westward is that of Barcos, formed between the reefs; hence several cays continue to the W.N.W. as far as Galindo; on the north side of which are two small cays, of which the most distant, about a mile off, is Galindito. From Galindo, other cays continue to the north-west to Cruz del Padre. About a mile N. by E. of Galindito is a shoal near the edge of the bank; and a mile northward of Cruz del Padre cay a chain of reefs commences and extends 6 miles westward.

Water.—On these cays, particularly at Cruz del Padre and Galindo, there are wells of good water.

LIGHT.—On the reef, about three-quarters of a mile N.E. of Cruz del Padre cay, is a conical white tower, 46 feet high, from which is shown, 49 feet above the sea, a *fixed* white light visible 10 miles. This light is not to be depended on.

Blanco, Mono, Piedras, and Monito Cays,* the westernmost of the cays and islets skirting the north coast of Cuba, lie about a mile from the edge of the bank. About 5 miles S.W. of Cruz del Padre, is a group of low cays, extending N.E. and S.W., named Blanco. To the southward of them, there is anchorage for vessels of 11 feet draught, with good shelter.

Mono cay lies about 5 miles W.N.W. from the Blanco group, and from it a shallow ledge runs off to the N.E. a full quarter of a mile; and a mile from the cay in the same direction there is a dangerous shoal (Palas rock) of $1\frac{3}{4}$ fathoms water. Piedras cay, composed of rock and sand, partly covered with low bushes, and about 3 cables in extent, lies 2 miles S.W. of the latter. Close off its north-west side are three rocks above water. A shoal of 16 feet water extends $2\frac{3}{4}$ cables N.E. from the north point of this cay, and a coral patch of 15 feet is situated one mile from the same point and in the same direction; depths of $5\frac{1}{2}$ fathoms were found between these shoals.

This patch lies with the peak of Matanzas between the rocks off Piedras bearing W.S.W., and Mono cay N.E. by N.; there is no discolouration of the water, but the sea breaks in heavy weather. There are from 5 to 8 fathoms water on either side of the shoal to within 3 cables of the cays. Monito cay lies N. $\frac{1}{4}$ E. $1\frac{3}{4}$ miles from Yacos point, S.W. by W. $1\frac{1}{2}$ miles from Piedras cay, and is a small black rock scarcely above the sea, a reef extends around it for about 2 cables. The channel between Piedras and Monito is clear. The soundings decrease as it is approached, and in the middle the depth is 6 fathoms. To sail through this channel a vessel should be able to lay up E.S.E. There is also a channel southward of Monito, but it is not recommended.

LIGHT.—On Piedras cay is an iron tower above a house, from which is shown, 74 feet above the sea, a *fixed* white light, varied by a *red flash every two minutes*, and visible 15 miles.

Anchorage.—There is good anchorage within the cays, in 6 fathoms, water, sandy bottom, with Piedras cay bearing West, and Mono cay from North to N.N.W.; or in four fathoms, to the southward of Piedras cay.

Tides.—It is high water, full and change, at Piedras cay, at 8h. 0m., and the rise is about $2\frac{1}{2}$ feet.

Cardenas Bay is about 9 miles deep, N.E. and S.W., and from 6 to 10 miles wide. The north side is bounded by a narrow strip of low, sandy, wooded land, which may be said to terminate to the eastward at

* See Admiralty plan :—Cardenas and St. Clara Bays, and anchorage formed by Piedras, Mono, and Monito cays, No. 410, scale $m=0.86$ inch.

Mangle cay; the entrance is so blocked up by small cays and shoals, and the bay itself so shallow, that it is only navigable for vessels of about 11 feet draught to the anchorages of Cárdenas and Siguapa.

The town of Cárdenas stands on the swampy shore at the south-west side of the bay, and is a place of considerable commerce, communicating by rail with Bemba, about 13 miles in the interior. The town of Siguapa is North-westward of Cárdenas, and they contain together some 5,000 inhabitants. The best channel for vessels entering this bay is that between Buba or Mangle cay and Diana cay. The bottom in the channel formerly recommended (between Chalupa cay and Diana cay) is irregular, and in the centre of the passage are some rocks, over which there is a depth of 8 feet. This channel is only frequented by small vessels. Pilots are not readily obtained if the breeze is strong. Small steamers* and droghers navigate within the cays as far to the eastward as the river Sagua la Grande.

LIGHT.—A *fixed* white light is exhibited from an iron column on the west side of Diana cay, nearly a mile south-east of Mangle cay. The light is 43 feet above the sea, and may be seen 7 miles.

Directions.—Vessels bound to the ports on the north side of Cuba, eastward of Cárdenas bay, should approach them from the eastward. The old Bahama channel is seldom navigated from West to East, except by steamers and coasters.

Coast.—About $1\frac{1}{2}$ miles south of Monito cay is the rather low point of Yacocs. At 17 miles W.S.W. of the point is that of Camacho, which is of sand with some bushes on it, and $2\frac{1}{2}$ miles farther on the river Camarioca empties itself; hence the coast trends about W.S.W. for 4 miles to Maya point, the east extreme of Matanzas bay. This part of the coast, which is low, woody, and sandy, may be approached to the distance of a mile.

PORT MATANZAS.*—The entrance to this port is open to the northward, and lies between Sabanilla and Maya points, bearing E.N.E. and W.S.W. from each other, distant 2 miles. It is about 4 miles in length, with deep water until nearly up to the shoals which shelter the anchorage. From Maya point, which is low, with some huts on it, a rocky ledge extends about $1\frac{1}{2}$ miles to the northward; and on a narrow bank of soundings, on the west side of the ledge, temporary anchorage will be found. To the southward of the point, in the south-east corner of the port, is the mouth of the river Canima.

* See Admiralty plan :—Port Matanzas, No. 415, scale $m = 0.95$ of an inch.

The western coast at the entrance, is bordered by a reef, which extends off from one to $2\frac{1}{2}$ cables. Within the port there are the detached shoals New, Stony, and another. The New is 2 cables in length north and south, and about half a cable in breadth. Its centre lies east $3\frac{1}{2}$ cables from San Severino castle, and 2 cables from the north shore.

Stony bank lies to the southward, and separated from New shoal by a channel one cable in breadth, which leads to the anchorage. Its northern edge is marked by a *black* buoy in 12 feet water, E. by S. $\frac{1}{2}$ S. 5 cables from San Severino castle. Another bank, about a cable in diameter, with 15 feet water on it, lies S. $\frac{1}{2}$ E. $3\frac{1}{2}$ cables from the castle, and is also marked by a buoy. Also six cables S. by E. $\frac{1}{2}$ E. of the castle, is another shoal, with 12 feet water on it, marked by a buoy, and from which shallow water extends to the southern shore. In fine weather these shoals may be seen.

The buoys in this port are very small, and are not to be depended upon.

The town of Matanzas stands on the western shore, on a tongue of land which separates the rivers Yumuri and San Juan, and communicates by stone bridges with extensive suburbs on the opposite banks. A shallow flat runs off in front of it, which prevents vessels from coming within half a mile of the wharves. The town, with its suburbs, contains a population of about 50,000. There is a steam factory adapted for ordinary repairs. The wonderful caves about $\frac{1}{2}$ a mile inland on the south shore are of world-wide fame.

Supplies.—A supply of coal can be depended upon at Matanzas.

Dock.—There is reported to be docking facilities for small craft.

Water.—The best water will be found about 3 miles up the river San Juan.

Tides.—It is high water, full and change, at port Matanzas, at about 8 a.m. and 5 p.m., and the rise $2\frac{1}{2}$ feet. The stream runs in with the sea breeze, and out with the land wind.

Directions.—When bound to Matanzas, the peak of Matanzas which overlooks it from the west is an excellent guide; and about 12 miles eastward of the port, and 6 miles inland, there is a small ridge of remarkable irregular hills of considerable elevation, but not nearly so high as the peak, with three distinct summits, called the Camarioca paps. From the paps the land westward is level and not very low, without any remarkable object as far as the port, where it begins to rise gently, and can be seen 24 miles, continuing uniform to the peak of Matanzas.

Coming from the eastward give Maya point a berth of 2 miles until the port is well open; then steer to the S.W., hauling up gradually for about a mid-channel course, taking care to avoid the bank of sand and rock which borders the point at the distance of 6 cables. Approaching from the west-

ward give the western shore a berth of about half a mile. When San Severino castle, a conspicuous object on the north shore of the port, bears W. by S., steer towards it until the fort of the Vigia, on the shore of the river San Juan, bears S.W. $\frac{1}{2}$ W., then steer for it, passing northward of the buoy on the Stony bank, and anchor in 5 or 6 fathoms water, mud, as the shipping will allow, the harbour being generally crowded. No reliance can be placed on the buoys being in position, so that it may be advisable for a stranger to take a pilot.

The port being exposed to the E.N.E., a heavy swell sets in with strong winds. The land wind during northers, from the middle of September to the end of February, is frequently interrupted, and a sailing vessel may probably be detained for a few days, as it is difficult and hazardous to beat out against the stream and sea.

Canima River.—In the south-east angle of the port about 2 miles southward of Maya point, is the mouth of the river Canima, and at the western point of entrance is fort San Felipe. The river is navigable for 9 miles, and carries from 6 to 15 feet water; but at the bar there are only from 6 to 9 feet, and it is dangerous during northers. A large number of small vessels are employed in the river, which convey fruit to Havana and Matanzas.

Coast.—From Sabanilla point the low and sandy coast trends to the W.N.W., for 8 miles to Guanós point, which is of little elevation. From Guanós point, as far westward as Havana, a distance of 36 miles, the coast is clear of danger, with the exception of the Juruco bank (page 434), and may be approached to a distance of 3 miles. It is steep-to, and the soundings decrease suddenly from 90 to 20 fathoms, sandy bottom. By attention to the lead there is no danger. The Jaruco hills rise about midway, and with other objects serve to distinguish the coast. The current here may be about a mile an hour to the eastward.

OLD BAHAMA CHANNEL.

As already stated in page 464, this channel* is seldom navigated from leeward except by small coasters, that can find anchorage during the night on either side, or by steamers. Vessels coming from to windward,† after passing through either of the N.E. Bahama channels, or along the north sides of Puerto Rico and San Domingo, generally keep the Cuba shore aboard, where the remarkable high lands already noticed enable them to check their reckoning, and keep a proper offing, according to the season. The current here usually runs to the westward, but not strong; if requisite

* See Admiralty charts :—Great Bahama bank, Sheets 2 and 3, Nos. 2,009, 2,075, scale $m = 0.24$ of an inch; and Ragged island anchorage, No. 1399, scale $m = 2.9$ inches.

† See page 598.

a pilot may probably be obtained from Barocoa (page 440). Great care should be taken to avoid the Bahama side.

Some few navigators, however, who have a thorough knowledge of the Bahama cays and banks, instead of taking this channel, prefer running through the Crooked island passage, thence round the south end of Ragged island, or St. Domingo cay, and then across the bank inside all the shoals, on the parallel of $22^{\circ} 42' N.$, quitting it either to the northward or southward of Guinchos cay. Vessels of 18 feet draught may do this (see page 503), for they can carry from 4 to 5 fathoms all the way, and anchor in safety whenever it is requisite; but we must again remark that it requires a thorough acquaintance with the locality, and of the mode of navigating by the eye.

The old Bahama channel may be said to extend from cay Verde to the Paredon Grande cay on the south, and from Diamond point to Guinchos cay on the north. This will make it about 50 miles in length. At the east end, between Diamond point and Confites cay, West of it, it is 18 miles wide. In the narrowest part, between the west end of the Labanderas reef and Confites cay, S.W. of it, the distance is only 10 miles. It then opens out slightly and very gradually, and at the west end it is about 14 miles across. In direction it turns gradually round from N.N.W. to W.N.W., requiring the utmost possible prudence and caution in the night-time or in thick weather.

The North Side of the Old Bahama Channel is equally dangerous as the south side already described, perhaps more so, as the dangers at the south-east end are out of sight of land, and on the very edge of the bank.

Diamond Point—which forms the north-east point of the entrance—is the south-west extreme of the Mucaras reef, and lies S.E. $\frac{1}{2}$ E. 19 miles from Lobos cay, East 19 miles from Confites cay, and is extremely dangerous, being almost wall-sided. From it the edge of the bank runs N.W. 10 miles to a spot nearly dry, at the east end of the Labanderas reef. This space is quite clear, and, in case of need, a vessel may run on it, and anchor anywhere in $5\frac{1}{2}$ or 6 fathoms water, clear sandy bottom, as far as 4 miles within the edge of the bank.

Labanderes Reef trends W. $\frac{1}{2}$ N. 5 miles, and is a narrow coral ledge quite wall-sided to the southward. The west end lies S.E. 5 miles from Lobos cay, and the ground between is foul.

Lobos Cay is a small rocky islet about a cable in diameter, and only 6 feet above the sea. Anchorage will be found to leeward of it, in 5 fathoms water, with the cay bearing E.S.E. from a half to a mile distant; but care must be taken to avoid the shallow sand bores, which will be seen from aloft,

about 2 miles to the north-west of it. A vessel may also run round the west end of these ridges by the eye, and anchor anywhere within them. From Lobos cay the edge of the bank takes a N.W. by W. direction for 36 miles to Guinchos cay.

LIGHT.—A *fixed* white light is exhibited from a lighthouse on Lobos cay, 146 feet above the sea, and in clear weather should be seen 16 miles. The tower is circular, 150 feet high from base to vane, painted with broad black and white horizontal bands, and its base is surrounded by the keeper's dwelling.

Guinchos Cay (called Ginger by the Bahama wreckers) is a small islet formed of sand and dead bleached coral, with a few stunted bushes on it. It is nearly the same size as Lobos, and about 6 feet high. About 8 miles N.W. of Lobos cay the edge of the bank becomes foul, and there are several narrow sand and weed ridges, on which there are from $2\frac{1}{2}$ to $4\frac{1}{2}$ fathoms. Anchorage will be found, in 4 fathoms water, to the westward of Guinchos cay, in a small clear space about half a mile from the cay; to the north-west and west of this, the bank is foul to the distance of 5 miles, but thence 4 fathoms is the least water, near the edge as far as the south-west extreme, 14 miles westward of the cay.

Tides.—It is high water, full and change, on the north side of the Old Bahama channel at 7h. 40m., and the rise is 3 feet. The stream runs on and off the bank from a half to a knot an hour.

Caution.—From the above description it is evidently advisable not to navigate the Old Bahama channel, during thick weather, or under unfavourable circumstances, and at all times it requires great caution and judgment, particularly during the winter season. At this period, between the months of November and March, northers prevail, and sometimes the wind will veer round to this quarter after intervals of only a few days. A short time previous to the change the trade wind will generally fall light, or a calm ensue for a few hours, and the land will be seen with unusual distinctness, but the barometer will scarcely give any warning. Dark clouds will be seen gradually rising to the W.N.W., and in a short time the wind will rush suddenly down from that direction, with the strength of a double or close-reefed topsail breeze. It will probably blow steady at N.W. for a day or two, more or less, and then draw gradually round to the North and N.E., accompanied by heavy squalls and rain, and wear itself out with the wind at East.

As the wind veers from the westward the barometer will rise, and the wind does not back. Should the weather indicate this change before the channel is entered, it will be better to remain outside, and maintain a

good offing to the northward of the Maternillos lighthouse, which will be a good guide, until the wind veers to the eastward of North. Should the vessel have entered the narrows, it will be better at once to seek an anchorage on the Bahama bank, through either of the openings described, between Diamond point and Guinchos cay, or run back and take up a position as pointed out above. During the remaining portion of the year the wind prevails from the East and S.E., and a vessel will not be exposed to this interruption and risk, except in the case of a hurricane, which however seldom occurs in this locality.

CHAPTER X.

BAHAMA ISLANDS AND BANKS.

 VARIATION in 1887.

Turk island -	0° 15' E.		Great Abaco -	1° 15' E.
San Salvador -	0° 40' E.		Cay Sal -	2° 55' E.

THE BAHAMAS.

These islands were the first land-fall of Columbus on his ever-memorable voyage in 1492, and, after a great deal of controversy, it would now appear that San Salvador or Watlings island was the first point on which he landed.* These islands were first settled by the English in 1629, who in 1641 were driven from them by the Spaniards. From this period to 1783 they frequently changed possessors, but in that year they were ceded to Great Britain and have remained in her possession ever since. Until 1848 they were under one government, but Turk and Caicos islands are now attached to Jamaica. All the larger islands are inhabited, and in 1881 the population of the whole group was 43,521. In 1884 the total value of the imports was 181,494*l.*, and the exports 122,351*l.*

This remarkable group is composed of numerous irregularly shaped white sandstone islets and rocks, thinly wooded, the loftiest about 400 feet high, most of them under 100 feet, and many only a few feet above the surface of the sea. They are generally situated on the edges of coral and sand banks, some of which are of the most dangerous character. One or two or the largest islets are clothed with wood of moderate dimensions, or of sufficient size for the scantling of vessels of from 150 to 200 tons burthen. Brazilletto, yellow wood, *lignum vitæ*, and fustic are exported in small quantities. The soil in general is of so light and stony a character that the verdure is scanty, and it is only capable of producing fruit, Indian corn, and vegetables. Cotton was at one time a valuable article of commerce, but it is not now cultivated to any large extent.

The most important product is salt, which is raked in great abundance at many of the islands. Fruit and a coarse description of sponge is also

* See the Land-fall of Columbus, by Capt. A. B. Beecher, R.N., 1856.

largely exported. Good water is rather scarce, and on some of the islands the inhabitants depend chiefly on rain water. Poultry is readily obtained at most of the inhabited islets, but cattle are scarce, although generally obtainable at Nassau; the breed of sheep are excellent. A most remarkable feature is the exceeding clearness of the sea water, which enables the bottom to be seen, from aloft, at considerable depths, and at some distance; the navigation of the banks is consequently conducted almost entirely by the eye, but care must be taken not to run with the sun-a-head of the vessel.

The space occupied by the whole group is somewhat triangular in form. Commencing at the Navidad bank at the south-east end, the south side trends about W. by N. for 600 miles; the north side N.W. by W. 720 miles; and the west side N. by W. 200 miles.

Winds.—The Bahama islands are all within the influence of the trade winds. Their lowness, of course, exempts them from the regular land wind, but in the summer season a light breeze frequently comes from the Florida shore in the night, and reaches the western side of the Little Bahama bank, but no farther. At this period the wind generally prevails to the southward of East, and the more so as their north-west extreme is approached; the weather is then very variable, and squalls rush down with great violence, accompanied with heavy rains and an oppressive atmosphere. They are within the zone of hurricanes, and a year seldom passes without their being visited by a heavy gale at least, from the S.E., which inflicts serious damage both on shore and at sea.

Northers.—In the winter months from about November to the middle of March, the trade wind is frequently interrupted by N.W. and North winds. In December and January this may be expected almost weekly. Previously to this change, the wind will draw round to the South and S.W. About 24 hours after, or less, dark masses of cloud will be seen rising from the westward, and in a short time the wind will rush suddenly from that quarter with the force of a double or treble-reefed top-sail breeze. It will soon veer round to N.W. and North with clear weather, and remain between these points two or three days. It will then haul gradually to N.E., perhaps with increased force, accompanied by heavy squalls, and wear itself out at East in the course of a few days.

The barometer is scarcely any guide; a small fall may be detected as the wind draws to the South, and it will rise rapidly with the North wind. The mariner may be sure of the action of the wind, and that it will not back at this period, and this will enable him to seek shelter if necessary with every confidence in the change that will follow. On the southern edge of the group this change may be more sudden, on account of the partial interference of the winds from the high lands of San Domingo

and Cuba on the regular trade; but it seldom takes place without a previous indication of dark masses of clouds to the westward.

Current.—A feeble stream, seldom exceeding half a knot, generally sets to the westward on the south side of the Bahama islands and to the N.W. on the north-east side; but it is liable to change, and often suddenly, especially in the North-west Providence channel, and on the north-east side of the Little Bahama bank. Here it will sometimes be found running strong to windward. Some observations tend to show that this is more frequently the case after northers, or on the increase of the moon. The opinions of the wreckers and Cayman fishermen appear to agree on these points; but there is no certainty in the matter, and, consequently, more than ordinary attention is required when navigating among the islands.

Tides.—It is high water, full and change, nearly everywhere in the Bahama group, at 7h. 40m.; springs rise 4 feet, neaps 3 feet; the only exception will be seen on the west side of Andros island. The tidal streams runs directly on and off all the banks, at the rate of from one to 2 knots, except in the narrow channels between the cays on the Great and Little banks; here its velocity is greatly increased, and in some places it is scarcely possible to contend against it.

Bank Blink.—This is a phenomenon described as a bright reflected light hanging over the clear white sand banks, and serving to point them out from a long distance. From lengthened experience, however, we warn the navigator most strongly not to trust to so fallacious a guide. It will be far better for him to depend upon the eye from aloft, the lead, the reckoning, and especially the latitude, which should be unremittingly checked. The navigation being generally from to windward we shall commence the description from that quarter.

Navidad Bank.*—This is an oval-shaped flat-bank of coral and sand, 22 miles long, in a north and south direction, and in the centre, 11 miles broad, with a depth of from 11 to 17 fathoms. The south end lies N.N.E. 32 miles from cape Cabron, the nearest part of San Domingo. The water is not sufficiently discoloured to render this bank visible.

Between the Navidad and Silver banks there are three small detached knolls, steep-to, with 10, 12, and 17 fathoms water on them. The supposed position of the Severn shoal is still shown on the charts, but the neighbourhood has been so closely searched that its existence is extremely doubtful.

* See Admiralty chart:—West Indies, sheet 2, No. 393, scale $m = 0.06$ of an inch. The directions which follow are compiled chiefly from the surveys and remarks of Capt. Owen, R.N.

Silver Bank lies 36 miles to the north-west of the Navidad, and 35 to the northward of cape Francés Viejo. Its eastern side is 29 miles long in a N.E. by N. and S.W. by S. direction, but bends westward near the middle, and at the bottom of the bight, near the edge, there is a dangerous shoal; its south-east and north-east points appear to have no dangers, but regular soundings from 12 to 15 fathoms.

The north side of the bank runs nearly straight N.W. by W. $\frac{1}{2}$ W. for 38 miles; but about 8 miles from the north-east point it becomes exceedingly dangerous and continues so all the way to the north-west point; and near the middle of this side rocky heads, which are awash, extend 5 miles inwards from the edge. The west side also runs nearly straight North and South 37 miles, on the meridian of 70° W., and 8 miles from the south-west point there is a foul patch close to the edge of soundings; but to the northward of this, to within about 7 miles of the north-west point, the bank appears to be free of danger for some distance inwards.

From the south-west point the south side trends E. by S., 24 miles, and for about the first 8 miles of this distance the edge is very dangerous; but to the eastward of this it appears to be clear: it will be better, however, not to venture on any part of the bank, for it has not been closely examined. As the water on the bank is not discoloured, except over the shoals, where it has a white appearance, the lead must be well attended when approaching it from any quarter.

Mouchoir Bank or Mouchoir Carré (square handkerchief), lies 28 miles westward of the north-west point of Silver bank, and is 31 miles in length, east and west, but irregular in breadth. The southern edge takes nearly a W. by N. direction, and, with the exception of a shallow patch 4 miles within it, appears to be free of danger, having a depth on it of from 9 to 14 fathoms. The eastern side trends northerly 20 miles, and terminates in a long point, or narrow spit; about $1\frac{1}{2}$ miles within the extreme end of the spit there is a small breaker. The outline of the north side is irregular and extremely dangerous to within about 9 miles of the west end,* where there is a patch of 6 fathoms. The rocky heads at the north-west extreme of the bank lie about S.E. $\frac{2}{3}$ S., 21 miles from East cay of the Turk islands group.

TURKS ISLANDS† are the easternmost of the Bahama group, and rise from a narrow bank extending about 35 miles N.N.E. and S.S.W.

* Capt. R. Owen, R.N., observes, "that the coral reefs on this side will probably become cays in the course of time, as they are already sufficiently above water to impede, if not to accumulate the ocean drift."

† See Admiralty plan:—Turks islands, No. 1,441, scale $m = 0.7$ of an inch.

Near the centre of the bank, however, a tongue of soundings extends eastward $7\frac{1}{2}$ miles from East cay, with a regular depth on it of from 8 to 10 fathoms. The nine islets of the group are composed of sand and sandstone partially clothed with stunted bushes, and a peculiar species of cactus, somewhat in the form of a Turkish cap; hence, probably, their name. There are no wells; and the inhabitants who reside on Grand Turk island and Salt cay depend upon rain water, caught in tanks. The Caicos islands furnish them with ground provisions; San Domingo, with cattle; and other supplies are generally obtained from America; so that strangers must not depend upon finding resources here.

Grand Turk Island is $5\frac{1}{2}$ miles long, in a north and south direction, and about a mile broad. It is low, except on the east side, which is formed by a narrow ridge of sand-hills, about 70 feet high. A dangerous reef extends N.E., $2\frac{1}{2}$ miles from the north point, and a narrow ledge of the bank, on which there are from 6 to 40 fathoms, runs off 6 miles farther. The reef skirts the eastern shore at the distance of about $1\frac{1}{2}$ miles, and connects itself to the small islets lying to the south-east as far as East cay. This little islet, which lies about 5 miles S.S.E. of Grand Turk, is 96 feet high, and the loftiest of the group. The reef is broken here and there, but there is no safe passage through for strangers. The north-west point of Grand Turk is also foul for half a mile, and a narrow ridge of soundings runs off, a mile outside the reef. The town, which is the seat of government, stands on the western shore, and in front of an extensive cultivated salt pond.

Ballast ground.—The least depth found on this shoal, lying off the town on the western side of Grand Turk island, was $8\frac{1}{2}$ feet, from which the north-west extreme of Grand Turk island bore N. $\frac{1}{4}$ E., and Look-out bore E. by N. $\frac{3}{4}$ N.

Within a depth of 3 fathoms the ballast ground extends one-third of a cable northward of the shoalest head, half a cable southward, and 30 yards westward—in this latter direction the bank is steep to; there being no bottom with 25 fathoms line, at one-third of a cable from the shoalest head.

Anchorage.—The anchorage for vessels loading salt, is off the town, both northward and southward of the ballast ground, (that to the northward is not recommended for sailing vessels), but so close to the shore, that it will be better for strangers to take a pilot. The shore is also foul all along this side of the island, and there is deep water half a mile from the shore. The difficulty in using this anchorage is in shooting in, which requires great judgment; in a sailing vessel, the better way will be

to keep the topsails at the mast-head, ready to throw all aback. This, however, must depend upon the strength of the wind, for care must be taken not to bring up too short, or the vessel will drag off, or hook her anchor to a rock and probably lose it.

Man-of-war anchorage, so called by the pilots, and is the best anchorage, is on the edge of the bank which shows white, in from 9 to 6 fathoms water, with the President's flagstaff, ($1\frac{1}{2}$ or 2 miles southward of the town,) bearing S.E. $\frac{1}{4}$ S., and the lighthouse N. by E. $\frac{1}{2}$ E. But should the vessel swing inshore, she will tail on to or near a rocky patch, with not more than 17 feet water on it. Vessels must therefore be prepared to weigh or slip, the moment the wind threatens a change, but between the months of April and August it never shifts from the eastward without ample warning; those merely wishing to communicate, should remain under sail.

Riding place, a little southward of Government house, also affords better anchorage than that off the town, and there is less surf for landing.

A large mooring buoy, painted red, has been moored in 7 fathoms on the edge of the bank off the centre of the town for the use of the mail steamers.

LIGHT.—An iron circular lighthouse, painted white, and 60 feet high, stands 2 cables, S.W. $\frac{1}{2}$ W., from the north point of Grand Turk island, and exhibits, 108 feet above the sea, a white *flash* light every *half minute*, which may be seen 15 miles. Near the lighthouse is a lofty signal post.

Hawk's Nest* is the anchorage under the south side of the island, and in the event of a vessel being obliged to quit that off the town, she will find this a safe roadstead until the wind draws round again to the eastward. The assistance of a pilot, is absolutely necessary and vessels drawing over 17 feet should not attempt it at all.

A reef, which runs S.W. $3\frac{1}{2}$ miles from the south point of the island, protects the anchorage from west to north-west, and about half a mile from the point there is a small intricate opening in it, called the Small cut, for vessels of 10 feet draught; and a mile from the point there is a larger one, called the Great cut, in which the depth is 18 feet, with Tony rock in line with the second hummock (from the southward) on Penniston cay.

Directions.—For Hawk's nest, the best channel is round the south-west end of the above south-west reef, as there will then be room

* See Admiralty plan :—Hawk's nest anchorage, No. 409, scale $m = 1\frac{1}{2}$ inches.

to beat up. In this case should the wind be well to the northward a vessel may haul round the reef, with the east end of Cotton cay, bearing E. by S.; this mark will lead between the reef and South-west bank, about half a mile to the south-westward, on which there are only 12 feet water close to the edge. Or she may pass to the southward of South-west bank with Toney rock in line with the south-west end of Cotton cay.*

In steering in on this line a cast of $4\frac{1}{2}$ fathoms will be obtained on the edge of soundings, and then 6 and 7 fathoms to within about half a mile of Cotton cay. To the northward of the latter cay there is as little as $3\frac{1}{2}$ fathoms right across, but to the eastward of this there are 4 and 5 fathoms to the anchorage above the Dunbar shoals. The whole space is, however, studded with numerous small rocky heads distinctly seen, and in beating up the eye must be the guide. The most convenient anchorage will be found between the Dunbar shoals and a small sand cay, 5 feet high, on South-west reef.

Salt Cay lies S.S.W. $5\frac{1}{2}$ miles from Grand Turk island, on the extreme western edge of the bank. It is almost triangular in form, the north side trending $1\frac{3}{4}$ miles east and west, the west side $2\frac{1}{4}$ miles north and south, and the east side $3\frac{1}{4}$ miles north-east and south-west. The north-west end forms a bold bluff, which rises abruptly from the sea to the height of 60 feet, and on the summit there is a small look-out house. The town stands on the west side towards the north-west end of the cay, between the beach and a valuable salt pond. There is anchorage before it of precisely the same character as that at Grand Turk, and the same precautions must be observed.

The space between Salt and Cotton cays is full of dangers, and should not be navigated except in a case of sheer necessity, when the eye must be the guide.

Sand Cay, the southernmost of the group, lies S. by W., $6\frac{1}{2}$ miles, from Salt cay, and is $1\frac{1}{2}$ miles long north and south, about 2 cables broad, and about 40 feet high. It is, however, nearly divided at the centre by a small neck of low bushy land, so that at a distance, in an east or west direction, it has the appearance of being two islets. Three-quarters of a mile S.S.E. of the cay, there are two small black rocks lying close together about two feet above the sea; they are steep-to, and have 5 and 6 fathoms water between them and the point, and 8 fathoms at three-quarters of a mile S.E. of them. On the edge of the bank, with the centre of the cay bearing N.E. by E., there are two patches with 3 fathoms water on them.

* See sketches of marks on plan.

Beacon.—An obelisk, 40 feet in height and painted red, has been erected upon the northern summit (35 feet above the sea) of Sand cay.

Sand cay is clear on all sides but the north. Here a coral reef runs off in that direction nearly 2 miles, and the sea breaks heavily over it, except after very fine weather. There are several small black rocks from 10 to 16 feet high on the reef, the northernmost of which lies about half a mile from the north end. The edge of the bank runs almost on a straight line between the reef and the south end of Salt cay, and this space is quite clear, with regular soundings right across to the eastward, of from 9 to 11 fathoms, white sand and fans.

From the eastward do not come upon the bank—which extends 4 miles eastward of both cays—until the south end of Salt cay bears W.N.W., for the ground to the northward of this line is very foul.

Moderate depths extend $1\frac{1}{2}$ miles westward from Sand cay, and anchorage will be found here in 6 fathoms water about a mile off, with the gap bearing E.N.E. Foul ground has, however, been reported; caution should be exercised.* A vessel can weigh with any wind, and run off the bank on a south course clear of all danger.

There are still the remains of some remarkable solid masonry on the cay, similar to those which may be seen at cape Isabélica on the San Domingo shore.

Endymion Rock.—The southern tongue of the bank extends S.W. by S. 8 miles from Sand cay, and on this spit is the Endymion rock, lying S.W. $\frac{1}{2}$ S. $5\frac{1}{2}$ miles from the south end of the cay, and 2 cables within the western edge of the bank. The rock has only 4 feet water on it, breaks in heavy weather, and is surrounded by a small cluster of rocky heads for a quarter of a mile. Should the sea not break, the rock becomes exceedingly dangerous, as the water over it is so dark that it cannot be distinguished from any distance. The bank between it and the cay is quite clear, with regular soundings of from 7 to 9 fathoms; there are 15 fathoms about $1\frac{1}{2}$ miles to the eastward of the rock, and from 7 to 16 fathoms between it and the south-west point of the spit, about 3 miles S.S.W. of it. The Swimmer rock, on the south-east point of the Caicos bank, bears from the Endymion W. by S. 12 miles.

Fawn Shoal, in latitude $20^{\circ} 51' N.$, and longitude $71^{\circ} 29\frac{1}{2}' W.$, was discovered by H.M.S. *Fawn* in 1868; and would appear to be of small extent, with from 8 to 14 fathoms water on it, and steep-to. Eight days were spent in unsuccessfully searching for this shoal by the U.S.S. *Nipsic*.

* A pinnacle rock, with 18 feet water, is reported to exist, with the north extreme of Sand cay N. $51^{\circ} E.$ $9\frac{1}{2}$ cables; Opening in the land East. Remark Book navigating officer H.M.S. *Plover* 1876.

in 1873. The reported position of this shoal was examined by H.M.S. *Fantome* in 1880. The examination occupied five days, but no indications were observed of its existence.

Directions for Turks Island Passage.—Turks island passage is generally chosen by vessels bound from the northward to the south-western ports of the West Indies; but, as already stated in page 220, the Mona passage is the safest. The navigator intending to take the former route should reach the latitude of $21^{\circ} 35' N.$, or 5 miles northward of the parallel of the lighthouse, and well to the eastward of it. In this position, without sighting land, he will be assured of being to windward of the islets and may bear up accordingly; great care, however, must be taken in checking the latitude during the night; this should be particularly attended to here, as the current sometimes sets strong to the north-west, and, should the vessel pass out of sight of the light to the northward, a serious accident might occur.

After making the light on Grand Turk island, great caution must be observed in rounding the north end of that island. Being in a position about three miles westward of it, a S.S.W. course for 30 miles will lead nearly 4 miles westward of the Endymion rock and 7 miles eastward of the Swimmer. The currents sets N.E. and S.W., but is irregular in strength. Should it be the winter months, and the wind veer to the southward of S.E., the usual indication of a coming change to the N.W., it will be better to remain to the northward of the islets where the light will be a guide, instead of beating about in the passage until the wind has veered round to that quarter. Should the vessel have entered the passage, and the wind become light from the southward, which frequently happens in summer or hurricane months, it will be better to anchor for the night in either of the clear spaces already pointed out between the cays. When making Grand Turk island from the north-westward, a square house at the east extreme of East Caicos island forms a good mark.

This passage is not recommended to vessels coming from the southward, and it may as well be stated here that, except they have a steady favourable wind, and are quite sure of their reckoning, it will be far more prudent to take the Crooked island passage (see p. 495). This will relieve them of risk and anxiety, and in all probability cause little if any delay. If bound from cape Haïti they may take the Caicos passage, provided the wind be not to the northward of E.N.E., but it should be done in daylight.*

CAICOS BANK.

This is a large shallow sand bank, extending 64 miles east and west, and 58 north and south. Its outline is, however, very irregular, and on all

* See pages xxxv and xxxix.—Passages.

sides, particularly at the southern portion, it is extremely dangerous, with no secure anchorage for large vessels. The north, and a large portion of the east sides, are bounded by a chain of narrow islands, which are thinly inhabited, wooded, and formerly produced cotton, but at present they are only used for raising stock and the cultivation of ground provisions, which are supplied to the Turks islands and Nassau. The inhabitants are principally fishermen and wreckers.

Philips Reef.—From cape Comete, the north-east extreme point of the group, a bank extends eastward for 5 miles; it then trends to the south-west, and reaches the shore about 4 miles southward of the cape, off Goods hill, at the south-east end of East Caicos. On the northern edge of this bank is Philips reef, a dangerous coral patch, about half a mile long, which always breaks, and is steep-to on the northern side. Its east end bears E. by N. $\frac{1}{4}$ N., nearly 4 miles from cape Comete, and N.W. $\frac{3}{4}$ W. 19 miles from Grand Turks island lighthouse. The bank does not extend more than half a mile northward of the reef; to the eastward it runs off 2 miles, and the depths are from 10 to 20 fathoms, and to the southward from 7 to 10 fathoms; so that vessels approaching from these latter quarters should pay great attention to the lead. In a case of necessity a vessel may pass between the reef and cape Comete, where the depths are 6 and 7 fathoms.

Grand Caicos Island.—From cape Comete the northern shore of East Caicos island forms a deep bight and trends westward for about 8 miles to its west end, which is separated from Grand Caicos by a passage for boats. The shore of this latter island runs to the north-west, forming an indentation for about the same distance to Haulover point, its north extreme; near the point there is a square house, and a large settlement on its east side; the land is of uniform height. All this part of the shore is skirted by a reef for from one to 2 miles, leaving shelter inside it for boats.

To the northward of Haulover point the reef extends eastward at least 2 miles, and under it there is anchorage for small vessels in case of necessity. The anchorage is open to the eastward, and a heavy swell generally rolls in, but there is always a strong outset, which would enable a handy vessel to beat out in moderate weather. From Haulover point the shore trends slightly round to the westward for about 10 miles to Juniper hole, the opening between Grand and North Caicos. There is shelter here for boats between two conspicuous bluff points.

Caution.—No stranger, however, should approach this part of the shore. There is a strong indraught into the bights, which is felt at the distance of 5 or 6 miles, and would prove fatal in the event of a calm, as it is steep-to outside the reefs.

North Caicos Island.—The north side of this island is skirted by a reef half a mile from the beach, and at the north-east point a dangerous ledge extends off for 2 miles. Outside both the ledge and the reef there is a bank of soundings about a mile wide, with 10 and 12 fathoms on it. This part is easily recognized, as the shore rises into a succession of hillocks about 100 feet high, and on the western of them is a large square house. Near the west end, within the reef, are three small, dark, conical islets, about 50 feet high, called the Mary cays. The coast here takes a S.W. direction for 15 miles into a deep and dangerous bight skirted by a reef about a mile from the shore.

Water.—Between the North Caicos and Providenciales there is a continuous range of small cays; and on one of them, called Fort George, a low sandy islet covered with brushwood, about 7 miles S.W. of the Mary cays, there are some wells of indifferent water, and the remains of a small fort and magazine. The reef under it forms a small well-sheltered harbour, carrying a depth of $2\frac{1}{2}$ and 3 fathoms.

Providenciales.—The north-west end of this island bears W.S.W. 18 miles from the Mary cays, and terminates near its extremity in a peaked hill of moderate height, upon which there is a pile of stones erected as a beacon. From the peak the land falls to the N.N.W. into a low sharp point, bordered by a dangerous reef which extends off for 2 miles, with shoal soundings outside it. On the west side of the point a bank extends off for half a mile, upon which there is anchorage in what is called Malcolm road.

The west side of Providenciales trends to the southward, forming two bays, each about 4 miles wide. The south extreme terminates in a bold white rocky bluff, nearly 5 miles N.E. by E. of the north end of West Caicos. From the south end of the north bay or Malcolm road, a dangerous reef extends off S.W. by W. 7 miles, and near the end there is a small dry sand bore lying about 3 miles northward of the West Caicos. A reef also stretches off a considerable distance from the latter island towards the spit of the former, leaving between them a vein of deep water 4 cables in breadth at the entrance, carrying from $5\frac{1}{2}$ to 2 fathoms, and running in to the eastward for 3 miles, or until at a distance of 2 miles from the south bluff of Providenciales.

A vessel may anchor southward of the sand bore in about 5 fathoms water, sheltered by West reef as far round as N.N.W. This, however, is not so good an anchorage as that under the south end of West Caicos. With the prevailing easterly winds, vessels under sail should wait for the flood tide before attempting to beat farther up Caicos creek, the

deep vein of water may be easily seen from aloft, and the reef to the northward protects the anchorage from northerly winds. The bluff or south-west point of Providenciales, bearing E. $\frac{1}{2}$ N., clears the shoals on either side.

Caution.—Vessels from the northward are apt to mistake the Providenciales for the West Caicos, and by hauling round the west end to the southward after dark get wrecked on West reef. With the Admiralty chart, however, and proper attention to the latitude, this ought not to happen, for the West Caicos could not be made upon any bearing to the westward of South without being close to the west side of Providenciales, or near West reef. There is also 10 miles difference of latitude between the north-west end of the Providenciales and West Caicos. The spit of West reef bears S.W., distant 10 miles from the north-west point of Providenciales, and extreme care should be taken in rounding it in the night.

West Caicos island is about 7 miles long in a N.N.E. and S.S.W. direction, and $1\frac{1}{2}$ broad, and is nearly of an uniform height of about 50 feet. Near the south-west point, however, there is a small hill 65 feet high, and another of 60 feet near the north end. The west side is steep-to, the bank extending only a cable from the shore, and in many places even less. The island is uninhabited and there is no water.

Anchorage.—There is good anchorage under the south side of West Caicos, in Clearsand road, with 5 and 6 fathoms water, sandy bottom, sheltered as far round as West, and plenty of room to weigh with any wind. The best berth is in 5 fathoms, with the south-east hill bearing N. by W., just within the edge of the bank. Vessels caught in the Caicos passage with a strong N.W. or N.E. gale, which may be expected from November to March, will find this a very convenient anchorage, the south-west reefs breaking the sea during the latter.

Cockburn harbour.*—From cape Comete the eastern shore of the cays on the east side of the bank takes a southerly direction 13 miles, when it makes a sudden bend to the westward for 2 miles and forms the south end of South Caicos. Long cay, which is about 3 miles in length N.E. and S.W., but very narrow, lies to the westward of the south end, and is separated from it by an opening 4 cables wide, called East or Cockburn harbour, the entrance to which bears W. $\frac{1}{2}$ S. 22 miles from the lighthouse on Grand Turk.

* See Admiralty plan:—Cockburn harbour, No. 2,332, scale, $m = 5.8$ inches.

Buoys.—Five small buoys are laid in this anchorage, the four eastern ones are for vessels to make fast to, the S.W. one is intended as a warping buoy for vessels hauling out.*

This anchorage† is about 3 cables in extent, with a depth of $3\frac{1}{2}$ fathoms, decreasing inwards to 2 fathoms, but completely exposed to the south-east. There is a small rocky islet, named Cove (or Dove) cay, nearly in the middle of the outer part of the opening, and the channel lies westward of it. The shoal patches lying east of Long cay have been removed, and the entrance to the harbour widened. There is now a depth of 16 feet to within 50 feet of the east extreme of Long cay; a pilot, however, is necessary, and one may be obtained at Grand Turk. The bank here does not extend more than 2 cables from the shore. A reef runs off a short distance from the south end of Long cay, and there is snug anchorage in $3\frac{1}{2}$ or 4 fathoms water off the west side, between it and a reef about a mile to the westward, with the south end of Long cay reef bearing E.S.E.

Ambergris cay, lying S. by W. $\frac{1}{2}$ W. 8 miles from Long cay, and $2\frac{1}{2}$ miles from the edge of the bank, is $3\frac{1}{2}$ miles long north and south, and about a mile broad. A hill in the middle of this cay rises to the height of 100 feet, and there are some remarkable white cliffs on its south-east side. About $2\frac{1}{2}$ miles northward of this islet are Fish cays, three-quarters of a mile within the edge of the bank.

Little Ambergris cay lies a short distance westward of Ambergris cay. It is about 4 miles long in an east and west direction, but very narrow, and so low as not to be easily distinguished from the edge of soundings.

Swimmer rock.—This dangerous rocky patch is about half a mile in extent, with less than 2 fathoms water on it. The White cliffs on Ambergris cay bear from it N.N.W. 13 miles, and may be seen in clear weather from an elevation of about 15 feet. The rock is steep-to on the east side, but the south-east point of Caicos bank terminates about 2 miles S. by E. of it, in which direction there are from 8 to 10 fathoms water. The edge of the bank along the east and south sides, being covered with dark weed, is not easily distinguished. From the south-east point the edge trends to the W.N.W. for about 8 miles, and then bends round to the south-west for about the same distance, to the south extreme of the Caicos bank.

* In 1885 these moorings were overhauled, the three principal anchors are of about 27 cwt. each, the four eastern buoys are connected to each other by $1\frac{1}{2}$ -in.-chain and to Dove cay by a 2-in. chain, the S.W. buoy is not connected to the others.—Government Notice, Turks island, 29 August 1885.

† It is proposed to build a pier from the shore towards cove cay, and to deepen that part of the harbour north of Cove cay.

Whale Breaker lies in the bight, 5 miles westward of the Swimmer, on the edge of soundings, and is a dangerous small rocky patch even with the surface of the sea. In heavy weather it breaks, spouting up the water to a considerable height—hence its name. There are several other dangerous spots along the southern edge of the bank; the southernmost, called South rock, has only 10 feet water on it, and lies South 8 miles from Shot cay, one of the Seal cays.

West Sand spit.—From the south extreme of the Caicos bank the edge takes a north-west direction in a wave line for about 29 miles to the south end of West sand spit. This sand spit lies north and south along the edge of the bank for 2 miles, nearly awash, and its north end dries at low water. It is called Sand cay in the old charts, and its north end bears S.E. by E. 24 miles from the south end of West Caicos.

For the first 17 miles from the south end of the bank its edge is quite clear, and comes within 8 miles of White cays, the westernmost of the Seal cays; but thence to the West Caicos it is very dangerous. All this side is of a light green colour, forming a strong contrast with the deep blue tinge of the ocean water. The colour is frequently reflected very strongly on the edge of the clouds, on what is called the bank blink (noticed in page 472), which may be seen many miles.*

French cay.—To the northward of West sand spit the edge of the bank is clear for about 5 miles. It is here that the small coasters and wreckers cross to the eastward, passing off the bank southward of Long cay. Mr. H. Kelly, Master of the S.S. *Aden*, 1881, reports having crossed the Caicos bank from Long cay on the east, to French cay on the west side, a distance of 39 miles, when not less than 14 feet water were obtained, and there were no dangers but could be seen. The edge now trends W.N.W. about 4 miles to French cay, which is a small low bushy islet, about one-third of a mile in diameter, covered with prickly pear, and frequented by great numbers of aquatic birds; from April to July large quantities of eggs are collected by the fishermen. A vessel may anchor under its lee in 6 fathoms, on the edge of soundings. From this cay to the West Caicos there is scarcely a clear space, and the bank all along is very steep-to.

MARIGUANA.

This island is 24 miles in length in an east and west direction, and from 2 to 6 miles in breadth, generally about 30 feet above the sea, and thickly wooded. Near the centre of the island there is a hill 101 feet, and towards the east end there are several small hummocks from 40 to 60

* Capt. Richard Owen, R.N.

feet high; Abraham hill, at the back of Start point, is about 80 feet, and a long flat ridge behind the south-east point 90 feet high. There is no good water to be found on the island; wood is in abundance. In 1857 there were 20 settlers located in Betsy bay at the west end of the island.

The north side trends about W.N.W., is indented with a few small exposed bays, and skirted by a reef along its whole length, which terminates about $1\frac{1}{2}$ miles northward of the north-west point; about $1\frac{1}{4}$ miles N.E. by E. of this point, on the edge of the reef, there is a cluster of high rocks. Under the lee of this spit there is good shelter for small craft, passing by the eye, close round the north-west point.

The west side runs nearly straight S.S.W. $6\frac{1}{2}$ miles, and is bold, the bank not reaching more than a cable from the shore.

From S.W. point the southern coast takes an easterly direction for about 4 miles and then trends S.E. to Start point, south of Abraham hill, to the north-west of the point, the bank extends out for half a mile, with a clear sandy bottom. Eastward of Start point, the shore trends to the north-east and east, forming a deep bight, called Abraham bay, which terminates at a point 5 miles E. by N. $\frac{1}{2}$ N. of the Start. A dangerous reef sweeps round between the points, at the distance of about 2 miles from the head of the bight, and is steep-to. About a mile eastward of the Start there is a small opening through which, by the eye, coasters may carry 2 fathoms into good shelter within the reef. From the east point of the bay the coast takes an E. by N. direction for about 4 miles to the foot of the centre hill at the narrowest part of the island, which is here 2 miles across, and then trends round S.E. for nearly 8 miles to the south-east point. Off the latter portion the bank extends about a third of a mile.

East reef.—The east end of Mariguana trends N.E. and S.W. $4\frac{1}{2}$ miles, and a dangerous reef commences at S.E. point, which extends to the eastward about 9 miles, and is 2 miles in breadth. At the south-east extreme of this reef are several dry rocks just above water, and at the north-east elbow there is a small low cay of rock and sand, a few feet high. On the south side of the reef, about 4 miles eastward of S.E. point, and nearly South of a small cay which lies close off the north-east point, there is a little opening through which small craft find their way into snug anchorage under the above cay. The extreme east end of the reef is 4 miles from this cay, which appears as part of the main land, except on a N.N.E. and S.S.W. bearing. The reef is steep-to on the south side, but soundings on the bank will be obtained within half a mile of the east and north sides.

Little Inagua island is somewhat quadrangular in form, 8 miles in length, east and west, and about 5 miles in breadth. At the

centre of the north-west side there is a flat hill, about 60 feet high, which is the only rising ground on the northern part of the island, and on the south side there are several hills of about the same height. The south-west point bears N.N.W. 5 miles from the north-east point of Great Inagua, and the south-west end of West Caicos is E.N.E. 25 miles from the east end of the island. A dangerous reef, steep-to, runs off three-quarters of a mile from the east end, and there are generally heavy breakers on it.

The north-east and north-west sides of the island—each about 5 miles long—present a bold rocky shore, with soundings on a clear bottom to the distance of about one-third of a mile. The south-west side appears also to be free of danger. The south-east side is about 8 miles long. Eastward of the south point, there is a small bay, and in front of it snug anchorage for small craft, protected by the reef, which terminates near the middle of this shore. The entrance to this anchorage is through a break in the reef about $2\frac{1}{2}$ miles eastward of the point. There are no inhabitants, but there are said to be wild hogs on the island, and consequently water.

GREAT INAGUA.*

This island is about 45 miles in extreme length, between the north-east and south-west points, but its outline is irregular; its greatest breadth, near the centre, is 18 miles north and south. The eastern side of the island trends N.N.E. 25 miles from the south-east point, but the northern portion of it for about 10 miles is only a tongue of land 4 to 5 miles broad.

About 9 miles northward of the south-east point, East hill, the highest on the island, rises 132 feet above the sea. There are several other small elevations on the south side generally about 30 high, which make like separate islands from the southward. The most western is Salt pond hill, about 90 feet high; this hill in the evening has sometimes been taken for the south-west extreme of the island, when approaching it from the southward, which has caused several wrecks in South bay and off S.W. point; the light near the point is now a Safeguard. These hills are covered with small stunted bushes and palmettos; the interior of the island is cut up with salt water lakes, the land being flat and wooded, and in places affording good pasturage for cattle.

The whole eastern side of the island is skirted by a reef, from a cable to half a mile from the beach, with the bank outside it for about half a mile. Towards N.E. point there are some sand hills rather higher than the rest of the coast, off which the reef extends nearly a mile, falling in to the point in a curve.

* See Admiralty chart:—No. 393, scale, $m = 0.06$ inch.

LIGHT.—On the shore, about a mile southward of Mathew town, and 2 miles north-west of S.W. point, stands a white conical tower, 114 feet high, from which is shown a *revolving* white light, 120 feet above the sea, attaining its greatest brilliancy *every minute*, and visible 17 miles.

Making this light, pay attention to its bearing, as it is seen over the land when not intercepted by objects, which is becoming more frequent by the growth of cocoa-nut trees.

Statira shoal.—From the south-east point of Great Inagua a spit of tongue of the bank, from 4 to 2 miles in breadth, runs off S.S.E. for 6 miles, and on it is a rocky patch, on which H.M.S. *Statira* was wrecked in 1815. It is about half a mile long, with as little as 6 feet water on it, breaks in heavy weather, and lies South 3 miles from the south-east point, S.E. $1\frac{3}{4}$ miles from Sail rock,—a small black islet 20 or 30 feet high, bearing S.S.W. $1\frac{1}{2}$ miles from the point,—and E. $\frac{1}{2}$ S. $9\frac{1}{2}$ miles from Lantern head, a remarkable prominent bluff 82 feet high.

The position of this shoal is only a third of a mile from the eastern edge of the bank, but the soundings are from 6 to 8 fathoms for $2\frac{1}{2}$ miles to the southward, and the same depth for $1\frac{1}{2}$ miles to the westward of it, so that the lead will give sufficient warning from these quarters, but not from the eastward. There are 6 fathoms between it and Sail rock, and about 5 fathoms between the latter and the main. The water on the bank being of a dark colour, it is difficult to distinguish the shoal, except in heavy weather, when the sea always breaks.

South coast.—From the south-east point the southern shore trends westerly about 28 miles to S.W. point. On either side of Lantern head the land bends inwards, forming bays. The shore is skirted by a reef for about 2 miles, which terminates about 5 miles to the westward of the head; but the shore to S.W. point is still foul to the distance of about a mile. To the eastward of the head, S. by E. $\frac{3}{4}$ E. from Lagoon hill, there is an opening through the reef capable of admitting small coasters to a snug anchorage within. The interior, however, is so completely studded with small coral heads, that the eye alone must be depended on as a guide. The bay on west side of the head is only safe with the prevailing trade wind, which is here more regular than at the islands of the north-west. About 4 miles eastward of S.W. point, the land trends round to the S.S.W., forming a bay, and is very low and foul.

Molasses road.*—About 2 miles E. $\frac{1}{2}$ N. from S.W. point of Great Inagua, and S.W. by S. from Salt pond hill, there is a rocky ledge about

† See Admiralty plan :—Mathew Town road, No. 2,025, scale, $m=3\cdot7$ inches. The description of the south-west and west sides is from remarks by Lieut. G. B. Lawrance, R.N., 1850.

half a mile in extent, east and west, called Molasses reef, it is steep-to, and the sea breaks on it with easterly winds. Molasses road is a clear spot eastward of the reef where vessels driven from the anchorage on the west side of the island may ride out north-west and north winds in safety. The ground, however, is flat and rocky, and they must weigh the moment the wind draws round to the usual quarter.

The best berth will be in 8 or 9 fathoms, just within the edge of soundings, and about a mile eastward of the reef, with Salt pond hill N. $\frac{3}{4}$ E. and S.W. point open to the southward of the reef W. $\frac{1}{2}$ S. Great care, however, must be taken in approaching, for with the wind off shore the reef does not show itself, and the discolored water is not easily seen at even a short distance; care must also be taken not to shoot too far in, and be prepared to anchor the moment soundings are struck.

West coast.—From S.W. point the low sandy shore sweeps round to the north-west for about 2 miles, and is foul to the distance of from one to 2 cables; it then takes a northerly direction 6 miles, to Middle point; this point is tolerably clear of danger.

Mathew Town road.*—Three miles northward of S.W. point is Mathew town, a small settlement scattered along the shore in front of extensive cultivated salt ponds. About half a mile northward of the town Mortimer hill rises to the height of 40 feet. The best anchorage with the usual trade wind is off the settlement, about 3 cables from the shore, at which distance there are $4\frac{1}{2}$ and 5 fathoms water, almost on the edge of soundings, or with the jail (a conspicuous conical roofed building surrounded by a white wall) bearing E.N.E. and the lighthouse S.S.E. $\frac{1}{2}$ E. in $5\frac{1}{2}$ fathoms sand.

A light is shown from a staff in front of the Custom House when steamers are expected.

The most convenient berth for a vessel of war is with a little bluff at the north end of the town bearing E. by N. Stand in under easy sail, and be prepared to anchor the moment the vessel is within the edge of white water, which may be seen from aloft; in anchoring, the black coral patches, easily seen, should be avoided. As already stated, a vessel must quit the moment the weather threatens a change, and stands to sea or run round to Molasses road. The usual warning has been described in page 471, and the barometer will previously fall to about 29.80. Vessels visiting the island for salt may, if more convenient, anchor off the mouth of the Salt pond canal, about $1\frac{1}{2}$ miles southward of the town; but they will

* See Admiralty plan :—Mathew Town road, No. 2,025; scale, $m = 3.7$ inches.

not ride here so smoothly, on account of the heavy swell which rolls in round the south-west end of the island.

Water.—Water is only to be obtained from a well in Man-of-war bay, except the inhabitants have any disposable from their tanks; but this is seldom the case. Wood is plentiful.

Tides.—It is high water, full and change, in Mathew road at 8h. Om., the rise is $3\frac{1}{2}$ feet at springs, and 2 feet at neaps. The flood sets to the southward along the west side of the island at the rate of about half a knot, and meets the flood coming from the eastward off S.W. point.

Man-of-War bay.—N.W. point bears N. by E. $\frac{1}{2}$ E., nearly 6 miles, from Middle point, and the shore receding between them forms Man-of-War bay. The bank extends about one-third of a mile from the shore all around the bay, affording anchorage on the edge, and shelter from all but westerly winds. With north and north-west winds, the best berth will be in the northern part of the bay, with the outer point W.N.W.; and with south and south-west winds, off the sandy beach in south-east part. There is no anchorage off the south shore. In anchoring the same precautions must be observed as when coming-to in Mathew road, and care taken to pick out a clear sandy spot.

Water.—The well noticed above is a cable inland from the north end of the south-eastern sandy beach. The water is generally brackish, except after heavy rains, when there is always an abundant supply; the path to it is rocky and uneven, and not at all adapted for rolling casks.

Alfred sound.*—The north-west point of Great Inagua is low, the tops of the palmetto trees on it being only about 20 feet above the sea. From thence the shore bends round to the eastward for $2\frac{3}{4}$ miles to Saline point, forming a sandy bay. A reef nearly dry at low water, and steep to, skirts this bay about $1\frac{1}{2}$ miles from the shore, and within it is Alfred sound, a snug anchorage for small craft drawing 6 feet, over white coral sand and patches distinctly seen. The entrance lies between North-west point and the west end of the reef: there is also a narrow intricate cut through the barrier, N.E. about $1\frac{1}{4}$ miles from the point. With the wind to the south-ward of East, a vessel of 12 feet draught may anchor in the opening to the westward, named Alfred road, taking care not to bring North-west point westward of S.S.W.; but it is by no means a desirable anchorage.

Water.—Near the middle of the beach there is a well, and firewood may be obtained near the shore of the bay in Alfred sound.

* See Admiralty plan :—Alfred sound, 2,022; scale, $n = 8.0$ inches.

Tides.—It is high water, full and change, in Alfred sound, at 8h. 0m., springs rise $3\frac{1}{2}$ feet, neaps 2 feet. The flood stream sets eastward, the ebb westward, at the rate of about half a knot.

North coast.—From Saline point, which is low and rocky, the northern shore of Great Inagua takes a north-easterly direction 7 miles to Palmetto point. The reef which protects Alfred sound comes gradually home to this point, and E.N.E. about 5 miles from North-west point there is on the edge a small cay about half a mile long. Three quarters of a mile eastward of the cay, and N. $\frac{1}{2}$ W. from a black isolated rock on the beach, there is a small cut through the reef, in which there are 8 or 9 feet water; the reef runs quite straight and is steep-to. Carmichael point, bears N.E. by E. $\frac{1}{2}$ E. about 6 miles from Palmetto point, and the coast between forms a bay about $1\frac{1}{2}$ miles deep, with a bold rocky shore all round steep-to. Midway there is a conical mound called James hill, about 90 feet high, which is remarkable as being the only elevated ground on the north side of the island westward of Carmichael point.

From Carmichael point to the north-east point of the island, E. by N. $\frac{1}{2}$ N. 23 miles, the shore falls back to the southward and forms an extensive bay, $8\frac{1}{2}$ miles deep, named Ocean bight. On the east side the bank runs off about a quarter of a mile from the beach, but the head and the western shore are steep-to, and present a bold rocky coast, against which the sea breaks with great violence, particularly during northerly winds. At the head of the bight there are a few hills from 70 to 90 feet high.

Hogsty reef, or Los Corrales, is in shape like a horse-shoe, convex to the east, $4\frac{1}{2}$ miles in length east and west, and $2\frac{1}{2}$ miles in breadth. The centre of the west end bears N. by W. $\frac{3}{4}$ W. 35 miles from North-west point of Great Inagua, and about S.E. $\frac{1}{2}$ E. nearly 38 miles from the west end of Castle island. The reef forms a good harbour, with a depth of from $3\frac{1}{2}$ to 5 fathoms; there are few black rocky patches on the clear white sand, but they may be easily seen and avoided.

At both ends of the horse-shoe there is a small low sandy cay, nearly devoid of vegetation. There is a tank for rain water on the N.W. cay. The reef extends about a mile to the W.N.W. from South cay, and the passage in lies between it and N.W. cay. There is good anchorage just inside the edge of soundings, in 6 fathoms, to the southward of N.W. cay; but there is plenty of room to work up the horse-shoe, if necessary.

Brown bank.—The position of this shoal in latitude $21^{\circ} 29' 52''$ N., longitude $74^{\circ} 44' 6''$ W. was fixed in 1874, by Commander A. V. Reed, of the U.S.S. *Kansas*; it extends 2 miles east and west, and one mile north and south, is composed of sand and coral, and can be seen

under very favourable circumstances. There are from $9\frac{3}{4}$ to 17 fathoms water on it.*

Directions.—Vessels bound through Crooked island passage, and being so far to windward, may use the anchorage at Hogsty reef for the night, in preference to that under Great Inagua; it will, however, be prudent to avoid so dangerous a bank altogether. The course from off S.W. point of Great Inagua to Castle island is N.N.W. $\frac{1}{2}$ W. about 80 miles, which will lead from 10 to 14 miles westward of the reef. It is seldom that any weather current will be found here, but it has been noticed; the run should be regulated, if possible, to get through the passage with daylight.

The Plana or Flat cays are two islets W.N.W. 22 miles from the west end of Mariguana island, and are separated by a narrow channel of ocean water. The eastern cay, which is 5 miles long east and west, and nearly a mile broad, is skirted by a reef extending a third of a mile from the north and south sides, and three-quarters of a mile from the east end. The west end of the cay forms a narrow point, is steep-to, and at about a mile from its extremity there is a hill 70 feet high, but the rest of the cay is low and flat. A bank, 3 miles broad, extends E.S.E. nearly $4\frac{1}{2}$ miles from the east end, and the general depth on it is from 5 to 8 fathoms; but on the southern edge there are some dangerous shallow spots, and the whole bank being a dark rocky bottom not easily distinguished, this end of the cay should be approached very cautiously.

The western cay is oval-shaped, $2\frac{3}{4}$ miles long N.N.E. and S.S.W., and $1\frac{1}{2}$ miles wide. A reef extends $2\frac{1}{2}$ miles northward from the north-west end, and at the north extreme it is nearly dry; it then turns to the south east and joins a cluster of dry rocks, about three-quarters of a mile northward of the north-east point of the cay. A bank extends off half a mile outside the reef to the north-east, and a full mile to the eastward of the north-east point, to within half a mile of the eastern cay. All the eastern

* Cuidado reef, between Mariguana and Little Inagua, is still marked on the chart, but its existence is doubtful; it was searched for unsuccessfully by Capt. R. Owen, R.N., in 1832, and by Commander R. L. Phythian, in the U.S.S. *Nipsic*, in 1873. H.M.S. *Argus* in 1879 passed near the reported position of this reef without observing any indications of its existence.

Clarion shoal, lying 15 miles S.W. of the south-west end of Great Inagua, on which the steamer *Clarion*, drawing 10 feet, is said to have struck on the night of 17th March 1842, was also carefully searched for by the *Nipsic*, without being found. The Spanish frigate *Volador* reports having sounded on it in 9 fathoms. H.M.S. *Argus*, in 1879, when in the vicinity of the reported position of this shoal, shaped a course to pass over it, and when about 3 miles S.S.W. of its assigned position, a depth of 10 fathoms was obtained by the hand-lead. The vessel was immediately stopped, and a cast of the deep sea lead obtained, when no bottom was found at a depth of 157 fathoms.

side of the cay is fringed with a reef for about a quarter of a mile terminating at the south-west sandy point.

Anchorage.—On the west side of the western Plana cay, near the south-west point, there is a clear bank of soundings extending about a third of a mile from the shore, on the edge of which anchorage will be found in about 7 fathoms water, with room enough to weigh, should the wind come unexpectedly from the westward.

Water.—At the back of the south-west point of the western Plana there are some wells of excellent water, a little behind the sand ridge; the casks can be rolled up and rafted off very conveniently; indeed, it is the best place for watering among these islands, with the exception of Nassau.

CROOKED ISLAND GROUP.

This extensive group of islets rises from a triangular-shaped bank, 48 miles in length north-east and south-west, 45 miles north and south, and about 30 miles east and west. The north-east point of Acklin island, the south-west point of Castle island, and Bird rock, form the angular points.

CASTLE ISLAND* is about two miles in length in an east and west direction, two thirds of a mile in breadth, and about 30 or 40 feet high. The south-east end forms a remarkable bold sand cliff; the south-west end runs off to a low sandy point. The edge of soundings is not more than the third of a mile from the south and west sides of the island; but a bank, with 6 to 12 fathoms on it, extends off to the distance of 3 miles from the east side, and then trends towards South Bluff of Acklin island. A chain of small dry rocks runs to the northward for about $1\frac{1}{2}$ miles, from the north-east end of the island, half-way to the south end of Acklin island. The north-east rock is very remarkable, resembling an old castle—hence the name of the island; and between it and Acklin there is a passage for boats.

LIGHT.—On the south-west point of Castle island, and 270 yards from the extreme, stands a conical tower, 114 feet high, of a whitish colour with 3 bands of red brick, from which is shown a *fixed* white light which illuminates 330° ; it is 123 feet above the sea, and visible 17 miles.

Fish cays.—From the south-west point of Castle island the edge of the bank runs almost directly for Salina point, on the west side of Acklin, about 3 miles from the south end of that island. Salina point is low and bushy, but the land rises gradually to the eastward to the height of 150 feet. To the southward of the point there is good anchorage in Jamaica bay, with the prevailing winds, in 9 fathoms water, on the edge of the bank.† From Salina point the coast trends eastward, but the

* See Admiralty plan :—The cays and shoals in the Mira-por-vos passage, No. 408, scale $m = 1.0$ inch.

† See anchorage on the S.W. side of Acklin island, on Admiralty chart, No. 393.

western edge of the bank takes a northerly direction for 12 miles to the southernmost of the Fish cays, and then bends round to the north-west to the south end of Fortune island, which bears N. $\frac{3}{4}$ W., 27 miles from Castle island.

Anchorage.—Abreast Fish cays the edge of the bank is clear for about one-third of a mile inwards, but elsewhere it is foul and dangerous, until close up under Fortune island, where there is a clear space on which a vessel will find good shelter from northers on excellent holding ground, with the south point bearing N.W. by N. distant three-quarters of a mile, and a small sand bore which breaks, E. $\frac{1}{2}$ S. Be careful not to shoot in too far, as the ground becomes foul a very short distance within the line of soundings.

FORTUNE ISLAND, or Long cay, is 9 miles in extent N.E. by N. and S.W. by S., varying its breadth from $1\frac{1}{4}$ miles at the south end to barely a quarter of a mile at the north extreme. About 2 miles from the south end, a hill rises gradually to the height of 110 feet, and is a good landmark approaching either from the northward or southward. Near the centre of the island, on the west side is Olver town the chief town and post office, and at the back of it a very productive salt-pond. The whole shore is steep-to; nevertheless, with the usual easterly winds, the few vessels that come here for salt find anchorage off the pond, but so close in that there is no room to swing, and it is dangerous; they must be prepared to quit the moment a change threatens. Small vessels will find anchorage in 5 fathoms on a sand spit, off the town, with the Look-out (a conspicuous wooden structure) bearing S.E. by E.

There is frequent communication by steamers to and from the West Indies and America, as also with Nassau by schooners.*

CROOKED ISLAND† is separated from Fortune island by a small channel, through which wreckers, drawing under 7 feet water, find their way into shelter from north-west winds. There is anchorage on the edge of the bank full three-quarters of a mile off shore, but not to be recommended. From thence the western side of the island trends N.N.W. $\frac{1}{2}$ W. 9 miles; the shore is low, woody, generally foul, and the edge of the bank is about 3 cables off shore. Three miles inland, the Blue hills rise to the height of about 200 feet.

A dangerous reef extends off N.W., 2 miles from the north-west point of the island, it then bends round gradually to the east and E.S.E., and skirts the northern shore at the distance of about a mile. A small cay, called Bird rock, about 10 feet high, lies N.N.W. about a mile from the

* Navigating officer H.M.S. *Bullfrog*, 1884.

† See Admiralty plan:—Crooked island anchorage, with views, No. 1,469, scale, $m = 5\cdot0$ inches; also plan on chart, No. 393, scale, $m = 0\cdot4$ of an inch.

north-west point, and close to the southward of it there is a narrow intricate opening in the reef, leading into a small well-sheltered basin within, named Portland harbour, in which there are $3\frac{1}{2}$ and 4 fathoms water; but it requires the assistance of a pilot. From the north-west point of the island, the northern shore takes an E.S.E. and S.E. direction 11 miles, and then trends eastward for about 8 miles, to its east end. At the bottom of the bight are the Major rocks, and about 4 miles to the eastward of them mount Pisgah rises abruptly from the shore to the height of about 200 feet.

Anchorage.*—The only anchorage off Crooked island is at about $2\frac{1}{2}$ miles southward of the north-west point, nearly abreast a remarkable large house standing close to the shore (in 1881 this house was in a state of decay, and nearly hidden by the bush). A short distance to the northward is Landrail point, which is low and rocky. The shore to the northward of this forms a low sandy beach.

This anchorage must be approached with great care, under easy sail, and be prepared to come to the moment soundings are obtained; or to back off if necessary. The edge of the bank will be seen from aloft; the bottom is sand and grass, good holding ground. In the winter season it must be left the moment the wind veers to the southward of East, but in the summer months a vessel may remain, as the wind is generally light from this quarter; it will, however, be more prudent to keep off under sail. A supply of stock and vegetables may generally be obtained here, but it will probably detain a vessel some hours.

During strong westerly winds the best landing-place is close northward of Landrail point, inside a reef running a little to the northward, and which affords shelter.

Water.—There are some wells of good water on the south end of the island, called the French wells; but as the anchorage here is full three-quarters of a mile from the shore, it is inconvenient for watering. There is also a convenient well of excellent water near Landrail point, and a good landing-place on the beach northward of it.

Tides.—It is high water, full and change, at Crooked island, at 7h., and the rise about $2\frac{1}{2}$ feet.

LIGHT.—A stone light-house tower, conical-shaped and faced with blue bricks, is built on Bird rock, from which at an elevation of 120 feet above the sea is exhibited a revolving white light, revolving once in every one and a half minutes and is visible 17 miles.

ACKLIN ISLAND, the largest of the group and containing about 400 inhabitants, is separated from Crooked island by an opening about $2\frac{1}{2}$ miles wide, but so shallow that it may be waded across at low

* See Admiralty plan, No. 1,469, scale, $m = 5$ inches. Crooked island anchorage.

water. The extreme length of the island from the north-east to the south-west point is 43 miles, and its breadth varies from about one to 7 miles. Its north side is about 9 miles in length east and west, and its north-east point bears E. $\frac{3}{4}$ S., about 29 miles from Bird rock, at the north-west end of Crooked island. A bank of soundings extends east and north-east 4 miles from the north-east point, having a general depth of from 5 to 12 fathoms on it; but E. by S. $\frac{1}{2}$ S. 4 miles from the point, there is a dangerous rocky patch nearly awash, called N.E. breaker, about a quarter of a mile in extent, which generally breaks. It lies within a quarter of a mile of the edge of the bank, where the depth is 20 fathoms, and bears W.N.W. 11 miles from the north-west end of Plana cay reef.

From the north-east point the eastern shore trends about S. $\frac{1}{2}$ E. 12 miles, with a slight curve inwards, to Creek point, where the island is little more than a mile in breadth; the shore is foul to the distance of about half a mile; about 2 miles from the former point there is a small reef harbour for wreckers. From Creek point the shore takes a south-west direction for 35 miles, and is skirted by a reef to the distance of half to $1\frac{1}{2}$ miles.

About 9 miles to the south-west of Creek point, the shore falls back to the westward and forms Abrahams bay, in front of which there is an opening in the reef leading into an exposed anchorage; but this side of the island is very dangerous, and had better be avoided altogether. At the distance of 6 miles E.N.E. from the south end of the island there is a remarkable prominent bluff headland, named South bluff, with a range of hills at the back about 150 feet high. The western side of the island is irregularly shaped, and from the shallow water on the bank only accessible to boats, or very small coasters.

The MIRA-POR-VOS* is a cluster of small low barren rocky islets at the north or thick end of a pear-shaped bank, 11 miles in length S.S.E. and N.N.W., and 6 miles in breadth about $3\frac{1}{2}$ miles from its north-west extreme. The northern islet, named North rock, is about half a mile in length, N.E. and S.W., very narrow, and from 15 to 20 feet high. It lies about half a mile within the edge of the bank, and the soundings around it for about 2 cables are from 5 to 9 fathoms.

N.E. rock lies S.E. $\frac{3}{4}$ E. about 2 miles from North rock, and is of about the same dimensions. This islet is foul to the north-east to near the edge of the bank, a mile distant; to the north-west a ledge extends off three-quarters of a mile, and between it and North rock the depths are 5, 6, and 7 fathoms; to the south-west it is connected to South cay by a reef nearly dry, on which there are several small dry rocks.

* See Admiralty plan of Mira-por-vos passage, No. 408; scale, $m = 1\cdot0$ inch.

South cay is the largest of the cluster, being three-quarters of a mile in length N.E. and S.W., and nearly half a mile in breadth; close off its eastern side there is a remarkable square black rock. In the centre of the cay there is an uncultivated salt pond; and on the south shore are two remarkable sand-hills about 30 feet high, which may be seen from the south-east point of the bank. In moderate weather, with the usual easterly winds, a vessel may anchor about half a mile from the west end of this cay, in 8 or 9 fathoms, clear sandy bottom.

To the south-east of the above cays there are several detached coral ledges, on which there are only 3 fathoms water, and a heavy swell generally rolls over them, which renders them dangerous. The outermost lies near the north-east edge of the bank S.E. by E. 2 miles from N.E. rock, and W. by S. 7 miles from the west end of Castle island. The outermost to the south-east lies S.E. $4\frac{1}{4}$ miles from the sand hills on South cay, close also to the eastern edge of the bank and S.W. $\frac{1}{2}$ W. 9 miles from Castle island. It is $2\frac{1}{2}$ miles within the south-east extreme of the bank and $1\frac{1}{2}$ miles from the south-west side. In these directions the soundings are from 7 to 10 fathoms, which depths will be carried all along from $1\frac{1}{2}$ to 2 miles within the western edge of the bank up to south cay; the lead will therefore be of great use in approaching from these quarters, and a bearing of the cay will indicate when south-westward of the coral ledges.

Tide and Current.—It is high water, full and change, at the Mira-por-vos islets, at 9h. 30m., and the rise is about 3 feet. The current generally sets S.W. over the bank a mile an hour.

DIANA BANK bears S. by E. 19 miles from the south end of Long island, and W. $\frac{1}{2}$ S. 20 miles from the south end of Fortune island. This bank of sand and coral, 4 miles in extent east and west, and 3 miles north and south, has from 9 to 15 fathoms water on it, and 20 fathoms on its edge, and may be made a useful guide to vessels beating through Crooked island passage in the night.

Directions.—Crooked island passage has already been recommended in page 478 as the best for vessels bound northward or north-eastward when coming from the southward, except during north-west winds. If intending to take this passage, it will be advantageous to get well up under the north-west end of San Domingo before shaping the course for Castle island. In the winter season, however, when the wind generally blows hard from the E.N.E. accompanied by a strong lee current and heavy sea, this will be a tedious matter, and it may be found more convenient to double cape Maysi (Cuba) as soon as it can be given a fair berth

From a position 10 miles eastward of the cape, the course to Castle island will be about N. by W. 115 miles, but the current must be allowed for, and other circumstances of wind and weather. There will not be much difficulty in this, for if there is a current it will be found running directly across the vessel's track either way, but seldom to the eastward.

Having passed Castle island, the course to the south end of Fortune island will be N. by W. 27 miles, and thence to the north-west end of the Bird rock reef North about 20 miles. No current will be found under the lee of the islands. Should the vessel be caught in the Crooked island passage by a north-wester, instead of beating about, which would be attended with considerable risk, it will be better to seek shelter, when the wind has drawn round that far, under the south end of Fortune island; or run out and keep under the lee of Acklin island, under easy sail, until the wind draws round to N.E., which it will do within two or three days.

Should the wind veer to the southward before the vessel has entered the passage she may haul round the north-west end of Great Inagua, and pass out on either side of Mariguana, but this should be done in daylight, and a wide berth given to Hogsty reef.

SAMANA or ATWOOD CAY is 9 miles long in an east and west direction, and about $1\frac{1}{2}$ broad. Its surface is hilly and uneven, and about one-third the way from the west end it rises to the height of 100 feet; it is uninhabited, and lies almost entirely out of the usual track of vessels. The north side of the cay runs nearly straight, and is skirted by a reef for about one-third of a mile. On the north side, about $1\frac{1}{2}$ miles from the west end, are three dry rocks close to the edge of the reef; the west point is low and sandy, and from it a narrow reef, nearly dry and steep-to, extends westward $2\frac{1}{4}$ miles, and is extremely dangerous in the night-time.

From the west end of the cay, the southern shore trends E.S.E. 3 miles, when it falls back to the northward, and forms two small bays. A dry reef sweeps out to the southward in front of the bays, and within it at the eastern end are two small cays. There is here also a remarkable white cliff, and the shore from thence trends E.N.E. 4 miles to the east point of the island. About half a mile from the east point is a cay a mile in length east and west, and 75 feet high, and 2 miles eastward of it another, much smaller and lower. The reef which skirts the southern cays continues in an unbroken line for more than a mile eastward of the latter islet terminating in a detached breaker at the eastern extreme.

Anchorage.—There is anchorage in 8 fathoms water, on the south-west side of Samana cay, about 2 miles from the west point, and 3 cables off shore, but the holding ground is not good.

Water.—Good water can be obtained by digging wells.

SAN SALVADOR OR WATLING ISLAND.*

This island, the established landfall of Columbus in October 1492, is about 12 miles in length north and south, from 5 to 7 in breadth, and its shores are slightly indented. The interior is largely cut up by salt-water lagoons, separated from each other by small woody hills from 100 to 140 feet high; it is, however, considered to be the most fertile of the group, and raises cattle and the best breed of sheep in the Bahamas. The inhabitants, about 500 in number, are scattered about the island; there is no safe anchorage except at the north end, where there is a reef harbour for coasters.†

LIGHT.—A lighthouse 50 feet high, constructed of coral stone, stands on the summit (named Dixon hill), near the north-east point of Watling island. From it is exhibited a *double flashing* white light, *every half minute*, showing *two flashes* of *two and a quarter seconds* duration each, with an interval of *four and a half seconds* between the flashes; it is elevated 165 feet above the sea, and should be visible in clear weather from a distance of 19 miles.

The light is partially obscured, by high land on the southern and western parts of the island, between the bearings of N. 1° W. and N. 6° E.; N. 8° E. and N. 66° E.; and from N. 74° E. to S. 87° E.

From the lighthouse the outer edge of the reef bears N.N.W. distant 5 miles. Mariners are cautioned against approaching the reefs surrounding Watling island too closely.

A bank, with from 6 to 15 fathoms water on it, over a dark bottom, extends $2\frac{1}{2}$ miles S.E. from the south-east point of the island, and on the inner part of it, at about half a mile from this point, are some small but remarkably high black rocky islets, named Hinchinbroke rocks.

The eastern shore of the island is fringed with a reef, for about one-third of a mile, which sweeps round the north end of the island 3 miles from that shore. On the eastern shore, soundings extend outside the reef a mile, and $1\frac{1}{2}$ miles from the north end of the spit.

There are several small cays on and within the reef off the north side of the island.‡ White cay, so called from its appearance, is the northernmost, and lies about three-quarters of a mile from the north-west extreme of the reef. About a mile northward of the north-west point of the

* Proceedings of Royal Geographical Society, January 1884.

† See Admiralty chart, No. 393, West Indies, Sheet 2.

‡ A rock not marked on the Chart was reported to be seen off the north-east part of the island by an U.S. mail steamer in 1872.

island is Green cay, and round the south end of it is the channel, with 7 feet water, leading into the anchorage for coasters.

The bank does not extend more than half a mile from the west side of San Salvador island, in many parts much less, and the edge is generally very foul. There is anchorage with the usual winds in about 8 fathoms, off the principal settlement named Cockburn Town under Riding rock point. In 1883 H.M.S. *Griffon* anchored in $3\frac{1}{2}$ fathoms with Riding rock point N.N.W., flagstaff N.E. by E., and S.W. point S.W. $\frac{1}{2}$ W. The south-west end terminates in a long low sandy point, steep-to, which bears N. by W. 66 miles from Bird rock, and N.E. $\frac{3}{4}$ N. 19 miles from the north-east end of Rum cay. About two miles eastward of the south-west point, in a small bay just under some houses on rising ground, there is a confined anchorage for small craft under the lee of the reef, which extends a short distance from the shore.

Gardener rocks.—In 1877 a buoy was placed to mark these rocks, but it cannot be depended upon; it was not in place in 1883.

RUM CAY* is about $9\frac{1}{2}$ miles in length, east and west, 5 in breadth at the east end, and 2 at the west. The south-east end rounds a little, and forms two remarkable white cliffs about 90 feet high, which may be seen by day 9 to 12 miles off; several of the hillocks on the cay are somewhat higher than this. A reef commences at the south point of the cay, and sweeping off nearly a mile from the shore, terminates off some dry wells at the south-east point; it is nearly steep-to, and should be carefully avoided in the night. The eastern side of the cay, to the northward, is bold and free of danger; and a bank of soundings extends from it 3 miles, and runs out in a spit to the N.E. 5 miles from the north-east end of the cay, on which the depths are from 12 to 20 fathoms. The population of this cay may be about 900.

North side.—The north side of Rum cay, from about 2 miles to leeward of the north-east point, is foul all the way to the north-west point, for about half a mile from the shore, and the soundings extend off about a mile, increasing in distance to the westward. From the north-west point a narrow spit of a dangerous reef extends out in a northerly direction for upwards of 2 miles.

West End anchorage.—Temporary anchorage may be found in 7 fathoms water on the edge of the bank, off the west side of the cay, about a quarter of a mile off shore, with the north-west point bearing North, and the south-west point, which is low and sandy, S.E. $\frac{3}{4}$ E. There is an excellent salt pond at this end of the island, and the salt is easily shipped at this anchorage in moderate weather.

* See Admiralty chart :—Great Bahama bank, Sheet 3, No. 2,075, scale, $m=0\cdot2$ of an inch.

South side.—From Sandy point, the south-west extreme, the shore trends eastward to within a short distance of the south point of the island, when it bends round to the south-east and south, forming St. George bay, at the head of which is the principal settlement, and near it a valuable salt pond. The bank extends southward about two miles from the shore, with a general depth on it of from 4 to 6 fathoms, but from Sumner point, the south extreme of the cay, the edge of the bank is fringed by a narrow broken ledge of coral, which extends westward about 5 miles, with from 9 to 15 feet water on it, and on which the sea breaks in heavy weather.

Within the reef there is excellent anchorage in St. George bay, secure at all times except in the hurricane season. Vessels leaving the anchorages at Rum cay for the northward had better pass round the west end of the cay, but they should clear Conception island before dark, as the current frequently sets strong to N.W.

Port Nelson.—The entrance to this anchorage westward of the settlement, is through a break in the reef about a quarter of a mile in breadth, and the least water is 4 fathoms. The channel, however, is intricate, and should not be attempted by a stranger, although the bottom is easily seen, but the least dark spot would probably mislead. Stand in with two small houses on Cotton field point, about $1\frac{1}{4}$ miles westward of the settlement bearing North, until the wharf of the settlement bears East; then steer for the wharf and anchor in 4 fathoms water, fair holding ground, and well protected from all winds.

Commander H.D. Grant, of H.M.S. *Steady*, says, the entrance through the reef is known by a white house, which can hardly be mistaken, bearing N. $\frac{1}{2}$ W.; the depth of water is about $4\frac{1}{2}$ fathoms, and a vessel can anchor anywhere east or west of the entrance in 5 fathoms, but not with it open, as a rather heavy swell sets in.

Or a vessel may steer in between Sandy point and the west end of the reef fronting St. George bay. This passage is clear of danger, but such as may be avoided by the eye. H.M.S. *Diadem*, 36 guns, went through this passage and carried not less than 27 feet water.*

Supplies.—The water on Rum cay is of good quality, but the supply is small. Fresh meat and poultry may be obtained.

The Tidal streams are variable, and irregular in force. They may generally, but by no means as a rule, be expected to set strongest at full and change of the moon, and then to N.W. or S.E.

* H.M.S. *Bullfrog* found as little as 15 feet in this channel, and the local pilot stated that not more than 3 fathoms could be depended upon.—H.M.S. *Bullfrog*, 1884.

CONCEPTION ISLAND is a dangerous uninhabited islet, very irregular in shape, about $2\frac{3}{4}$ miles in length north and south, and $1\frac{3}{4}$ miles in breadth near the centre, which is its broadest part. Its general height is about 90 feet, but close off the east point there is a small islet one-third of a mile in diameter, and 130 feet high, called Booby cay. On the north-west side there is a clear open bay, with good anchorage on a sandy bottom, sheltered from N.N.E., round easterly, to S.S.E. The depth is 6 fathoms about a quarter of a mile from the edge of the bank, but farther in, the bottom becomes foul.

A reef, which skirts the south-west side of the island at the distance of about one-third of a mile, extends in a curve to the south-eastward, and terminates $1\frac{1}{2}$ miles East of the south point, and at its extremity there is a cluster of small dry rocks running to the northward. From a mile eastward of the reef the edge of the bank takes a northerly direction, passing about 2 miles eastward of Booby cay, and is full of shoals; the approach to this side is extremely dangerous, even in daytime, as the dark rocky heads are difficult to distinguish from the ocean water. The bank extends off $3\frac{1}{2}$ miles from the north side of the island and is equally dangerous; it is pretty clear in the centre, with variable soundings; but along its western side there is a dry reef (Southampton reef) on which the sea always breaks, extending North $3\frac{1}{2}$ miles from some small cays, near the north-west end of the island.

Water.—On the western side of the island, about half a mile southward of the south point of the north-west bay, is the entrance of a small creek leading into a lake in the centre of the island, and near the mouth there is a well of good water.

Current.—The current in the neighbourhood of Conception island generally sets strong to N.W.

GREAT BAHAMA BANK.

This extensive bank* is so irregular in its shape, that we must refer the navigator to the chart, for its general outline. Having already in page 467 described a portion of the southern edge between Guinchos cay and Diamond point, the description will be taken up at the latter point, and continued eastward.

From the north end of Mucaras reef, the southern edge of the Great Bahama bank takes an easterly direction for about 26 miles, and then trends S.E. 25 miles, where it forms a large rounded point, called South head. Near this extremity, in lat. $22^{\circ} 2' N.$, long. $76^{\circ} 23' W.$, there is a dangerous coral head, nearly awash, and not easily seen, as the bottom is

* See Admiralty charts :—Great Bahama bank, 4 Sheets, Nos. 1,496, 2,009, 2,075, 2,077; scale, $m = 0.2$ of an inch. Also, West Indies, sheet 2, Providence channels to the Windward and Mona passages, No. 393; scale, $m = 0.06$ of an inch.

here covered with dark weed. Hence the edge trends round to the north-east for about 22 miles, and then to the southward, forming a curious bight about 10 miles deep and nearly the same in breadth. All this part of the bank being studded with numerous small coral heads and ledges, nearly dry in many places, which extend from the edge of soundings to the parallel of $22^{\circ} 40' N.$, is quite impassable to strangers. There is generally, however, a depth of 4 and 5 fathoms between the coral patches, in the space for about 30 miles to the eastward of the Mucaras, and small vessels trading between Cuba and Nassau manage to pilot themselves across by the eye into the Tongue of the ocean.

Holes.—A very remarkable feature met with on this part of the bank, is dark discoloured water having all the appearance of rocky ground, but which are small circular wall-sided holes or wells, from 13 to 24 fathoms deep, called Blue holes and Red holes.

Magallanes bank is a narrow coral ledge, about 5 miles long in a N.N.E. and S.S.W. direction, lying N.W. $\frac{1}{2}$ W. 28 miles from St. Domingo cay, and East 13 miles from South head. On the north end the depth is $5\frac{3}{4}$ fathoms, in the centre $5\frac{1}{4}$, and towards the south end 8 fathoms.

St. Domingo cay.—At the south-east extreme of the above bight in the bank, there is a small dangerous head, from whence the edge of the bank trends to the south-east and south to St. Domingo cay. This little cay, only about $1\frac{1}{2}$ cables long and 15 feet high, is on the extreme south point of the bank, which forms a narrow tongue. Two miles northward of the cay, on the western edge of the bank, there is a dangerous coral ledge, $3\frac{1}{2}$ miles long north and south, with as little as $7\frac{1}{2}$ feet water on it. The space between is quite clear, and a vessel may anchor here in moderate weather, about midway between the south end of the ledge and the cay.

To the northward of the ledge the bank is free of danger for 11 miles until within 3 miles S.W. of the Brothers, where there are two small heads of coral lying close on the edge of soundings, and on which there are only 2 fathoms water. The westernmost head bears W. by S. $\frac{1}{2}$ S., 4 miles from Icely rock. At 7 miles N.W. $\frac{3}{4}$ W. of this there is another small head of 9 feet, lying S.W. $\frac{1}{2}$ W. 9 miles from the hill at Ragged island.

A reef extends a mile N.E. by E. from St. Domingo cay; and 3 miles in the same direction from the cay, and near the edge of the bank, there is a rocky patch with 8 feet water, on which the sea generally breaks. From thence the edge of the bank takes a N.E. by N. direction 18 miles, and for the first 12 miles it is quite clear; the soundings near the edge are

irregular, but a short distance within, the depths are 8 and 9 fathoms on a clear sandy bottom. From the above position the bank trends easterly for about 10 miles, and then N.E. by E. 8 miles to Verde cay. All this part is very foul and extremely dangerous. There is a ledge nearly dry, called the St. Vincent rock, lying W.S.W. $11\frac{1}{2}$ miles from Verde cay, and the bank within it for the space of 7 miles to the north-west is full of dangerous small rocky heads with deep water between.

Verde cay.—This narrow islet is about two-thirds of a mile long north-west and south-east, covered with low sea-grape trees and prickly-pear bushes, and frequented by large flocks of boobies and man-of-war birds. The north end is low, but the south point rises to a hill 72 feet high. On the west side there is a projecting sandy beach, skirted by a ledge of rocks dry at low water, which makes landing difficult. There is anchorage under this side in 7 fathoms water, but not to be recommended, as a heavy swell rolls round both ends of the cay in strong breezes. A small cluster of low rocks lies off the north-west point, and half a mile N.N.W. of them there are a few more just awash at high water with $4\frac{1}{2}$ fathoms between the clusters, over a dark rocky ledge. From the outer rocks a shallow ledge runs off N.N.W. $2\frac{1}{2}$ miles.

Verde cay lies about a mile from the south-east extreme of the Great Bahama bank, the east side of which from this position takes a northerly direction for 7 miles, and is clear of danger; it then bends round to the north-west for 6 miles, and becomes extremely dangerous. Thence the edge of the bank trends westerly about 12 miles, and in this space there are a few small shallow heads, which may be seen in clear weather; within them the ground is clear white coral sand for 8 miles to the southward: the edge then curves a little to the southward, and trends for about 15 miles westward towards the north end of Ragged island, and is quite clear.

Little Ragged island is $1\frac{3}{4}$ miles long north-west and south-east, and from half to a mile broad. Its north end is low, and separated from Great Ragged island by a little opening nearly blocked up by small cays and rocks, and under their lee there is an excellent boat harbour, which is entered from the westward. Off the south-east end of the island are several small low rocky islets, steep-to, having a depth of 4 and 5 fathoms 2 cables outside them. Nearly $1\frac{1}{2}$ miles S.E. by E. $\frac{1}{2}$ E. from the southern islet, named South rock, and $1\frac{3}{4}$ miles N.E. by E. $\frac{3}{4}$ E. from Hobson breaker, there is a small rocky patch, with 16 feet water on it, and 5 fathoms round it.*

Hobson Breaker is a small rock, lying S. by W. $\frac{1}{4}$ W., $1\frac{1}{2}$ miles from South rock and S.E. by S., $3\frac{1}{2}$ miles from Wilson point. It is just

* See Admiralty plan:—Ragged islands anchorage, No. 1,399, scale, $m = 3\cdot0$ inches.

level with the sea at low water, and always breaks even in fine weather. There is a clear passage on either side of it.

The Brothers are a group of rocky heads, among which are two small black rocks about 5 feet high. The easternmost, named Lloyd rock, lies S. $\frac{1}{2}$ E. $5\frac{1}{2}$ miles from Hobson breaker; the other, called Icely, is a mile farther westward.* On the south side they may be approached to about a mile, but a dangerous cluster of coral patches extends 4 miles to the northward of them, leaving a clear channel, $1\frac{1}{2}$ miles wide, between it and Hobson breaker. It will be better, however, to pass to the northward of the breaker, between it and the shallow sand spit which runs off about 2 miles W.S.W. of Little Ragged island.

Anchorage.—There is good anchorage under the west side of this latter spit in 3 fathoms water, with the south end of Little Ragged island bearing E. $\frac{1}{2}$ S., and Wilson point N. $\frac{1}{2}$ E. In standing in, however, take care to avoid several small coral heads, which are easily seen from aloft.

Tides.—It is high water, full and change, at Ragged island anchorage at 8h. 15m., and the rise is 4 feet.

Directions.—It has already been observed, when describing the navigation of the Old Bahama channel in page 467, that vessels of 18 feet draught and under may be safely taken round the south side of Ragged islands by the Admiralty charts, and thence across the bank within the dangers on the edge; provided they have good local experience of this peculiar navigation, which depends so much upon the eye; or the assistance of a pilot, which, however, is not easily obtained. In coming from the north or north-east with this view, they should run through Crooked island passage, and, from a position about 7 or 8 miles West of Bird rock, the course will be S.W. by W. 80 miles for the hill, 95 feet high, near the south end of Ragged island.

Great care, however, must be taken in approaching the dangerous part of the bank to the northward of Verde cay, (page 502), which should be done, if possible, in daylight, as strong currents are frequently experienced, and vessels should enter on the bank about 6 or 7 miles to the eastward of Ragged island; the edge at this part is easily seen from aloft. The current will probably be found here, setting either S.W. or N.W. Should the vessel be set to the northward, Ragged island will be readily distinguished by its being so much higher than the islets in the immediate neighbourhood.

* These two rocks were named after two officers who were drowned here during the survey.

Having entered on the bank, it will be better to round South rock, about half a mile off, and then steer W.S.W., $7\frac{1}{2}$ miles, or until the Beacon hill on Ragged island bears N.E. $\frac{1}{4}$ N., when haul up N.W. by N., 18 miles. Having run about 10 miles on this course, the tail of the Darvill sand spit will be crossed, the soundings being a sufficient guide to avoid it, for if 3 fathoms are obtained at *low* water, the vessel will be to windward, and should edge to the westward until it deepens to $3\frac{1}{4}$ fathoms, and then haul up again.

Having run the above distance, 18 miles, the course will be N.W. 25 miles, which will lead through the narrowest and worst part of the channel between the Cochinos and the Nurse sand-banks, and a good look-out must be kept for small black rocky patches. In running this course, the depths ought to be from 4 to $4\frac{1}{2}$ fathoms at *low* water; if less is obtained the vessel will be too far to the eastward, if more, to the westward; but remember that the east side is always the safest, and take the precaution to measure the lead line (when wet) to *feet* between 3 or 4 fathoms, for the soundings on the chart may be fully relied on.

It is high water, full and change, here, at 8h. 0m., and the rise and fall 3 feet; scarcely any tidal stream will be felt. Should darkness overtake the vessel before having reached thus far, it will be better to anchor, which may be done anywhere in safety. It would not be prudent to attempt to beat through this part of the channel. At the end of the above course the vessel will be $3\frac{1}{2}$ miles off the north extreme of the Cochinos on the parallel of $22^{\circ} 42' N.$, and a W. $\frac{1}{4}$ S. course will lead off the western edge of the bank to the southward of Guinchos cay, clear of danger, and in from $4\frac{1}{4}$ to 5 fathoms water all the way. Care, however, must be taken to keep on the above parallel, by checking the latitude as often as possible.

Approaching the bank from the south-east, St. Domingo cay may be sighted and the bank entered on, to the north-west of it; but this requires more than ordinary care. In this case, having rounded the south-west end of the cay about a mile off, steer N. by W. for 20 miles, which will bring the vessel to a clear space on the edge of the bank, where she can enter, and 6 miles farther upon this course Ragged island will be sighted bearing N.E., when the route described above can be taken. Great care must, however, be taken when passing the Brothers, two shoals mentioned in page 503, for these rocks will scarcely be seen from aloft; and the run should not be made without clear daylight.

The bank may also be entered upon at Verde cay, and perhaps with less risk. In taking this route, having rounded the south end of the cay, steer N.W. 10 miles, and then West 20, when the vessel will be up to Little Ragged island; but on all occasions, when among the shoals,

the mariner must endeavour not to steer with the sun directly in his face, which completely prevents their being seen, even at a very short distance.

Great Ragged island is nearly 4 miles long in a N.N.W. and S.S.E. direction, and the southern half is about $1\frac{1}{2}$ miles broad, but the northern portion is merely a narrow neck of low land; as already mentioned, near the south end a woody hill rises to the height of 95 feet above the sea. About $3\frac{1}{2}$ cables N.N.W. of Beacon hill is a flagstaff. The island contains about 160 inhabitants, and possesses a valuable salt pond, but supplies are scarce.

Water.—The south end of the island forms a sandy bay, and near the centre, not far from the shore, there is a well of good water. There is also a more convenient well, and with better water, in a small bay about half-way along the west side of the island.

Ragged island harbour.*—At the north end of Great Ragged island, between it and Hog cay, there is a small harbour capable of receiving vessels of 13 feet draught. The entrance lies close to the southward of Black rock, off the south-east rocky headland of Hog cay, between it and Outer bar reef, lying in the centre of the opening. In 1877 H.M.S. "*Bullfinch*" found 11 to 13 feet, where 16 to 20 are marked on the Admiralty plan north of the outer bar reef. The reef is probably extending itself to the northward. The usual anchorage for vessels wishing to communicate with Great Ragged island is off Hog Point, as being quite as convenient and more easy of approach than Ragged island harbour. The channel is, however, only half a cable wide, with a depth of 13 feet across the bar at low water. The ebb runs out with great force, but with the usual winds blowing strong, there will be great risk in attempting to beat out, except in a handy fore-and-aft rigged vessel that can ensure staying.

In a case of sheer necessity a vessel may run in by the eye with the assistance of the Admiralty plan, by bringing Pig point, the south-east extreme of Hog cay, to bear S.W. by W. $\frac{1}{4}$ W., and steer for it, which will lead between Black rock and Outer bar reef, until Pig point and the north end of Pigeon cay are in one; then steer so as to pass half a cable from Pig point, and anchorage may be taken up as convenient. But a stranger should take a pilot, who will be at hand by making the usual signal in time. Small coasters find their way out, over the bank to the westward.

Tides.—The following remarks on the tides at Ragged islands are made from a long period of observation by Mr. Duncan Taylor:—"From

* See Admiralty plan:—Ragged island harbour, No. 1,472, scale, $m = 6\cdot6$ inches.

the first of January to the last of April they rise from 16 to 18 inches, and the tide that flows an hour after the rising of the moon is uniformly 6 or 8 inches higher than the tide which flows after the setting of the moon. It frequently happens in the above months that they do not rise more than from 6 to 12 inches. The spring tides in the above period generally rise from 6 to 10 inches more than the neaps. From the beginning of May to the first of October, the period of light winds, both tides gradually rise till they arrive at the height of from 10 inches to 2 feet 4 inches on the neaps, and from 18 inches to 3 feet 6 inches on the springs, and then continue diminishing until January."

The Jumentos.—From Great Ragged island a range of low narrow islets and small barren rocks, lying nearly on the edge of the bank, takes a N. by W. direction for about 40 miles to Flamingo cay, which is 129 feet high, and by far the highest of the group. They then sweep round in a curve to the north-east and east for 35 miles, to within a short distance of the west side of Long island. These islands are generally called the Jumentos, but the pilots and wreckers give this name only to those lying north-eastward of Water cay. These are much smaller and lower than the others, indeed most of them are only a few feet above the sea. There are several wide openings in the chain navigable for vessels of light draught, and which might be used most advantageously in crossing the bank; but the islets are so much alike, that until they are distinctly pointed out by beacons it would be extremely rash for a stranger to attempt to pass through, without a thorough knowledge of the locality, and experience in the navigation of these banks.

Racoon cut,* the first of these openings, is about 7 miles northward of Great Ragged island; it is, however, so narrow and winding as to be difficult of access but to small vessels, as the channel south of the sand spit extending a mile westward from the south end of Racoon cay carries only 12 feet. Racoon cay has about 25 inhabitants on it, and possesses good water and a valuable salt pond, and the salt is conveniently shipped from an anchorage close under the west side. Vessels bound here for this purpose, drawing over 12 feet, had better take the route described in page 503, round the south end of Ragged island, and haul in round Darvill spit.

Nurse channel,† lying 10 miles farther northward and about W.S.W. 58 miles from the south end of Long island, is much easier of access, and 3 fathoms water may be carried through it, taking care to

* See Admiralty plan:—Racoon cut, No. 1,470, scale, $m = 4.0$ inches. The description of these cays is from the surveys of Capt. E. Barnett, R.N.

† See Admiralty plan:—Nurse channel, No. 1,494, scale, $m = 4.0$ inches.

steer clear of the heads. The bottom, however, at the entrance and for some distance in, is rocky, and being dark is alarming, especially where the strong tide ripples over the ledges. To the southward of this opening the cays lie close together, and are from 50 to 70 feet high. On the east side of Nurse cay there are some remarkable sand cliffs 50 feet high, and on Channel cay, 21 feet high, there is a beacon 39 feet in height which serve as good guides. To the northward of the channel the small barren rocky islets are much lower and more scattered.

Man-of-war channel, 16 miles farther northward, W. $\frac{1}{2}$ S. 55 miles from the south end of Long island, and about N.N.W. 35 miles from an offing 7 miles east of Ragged island, is by far the best of all. Here a depth of 4 and 5 fathoms may be carried on to the fairway of the bank, avoiding the rocky heads, which may be seen from aloft, provided the sun is astern of the vessel and the sky is not overclouded. The opening between Jamaica and Man-of-war cays is 3 miles wide. The former is 35 feet high, the latter 80 or about double the height, and Flamingo cay, 5 miles northward of the latter, being 129 feet above the sea, while the islets to the southward are all very much lower, the opening is somewhat easily recognised. This is the northernmost channel navigable for any but very small coasters.

Directions.—In running through Man-of-war channel we must refer the navigator to the Admiralty chart, which clearly shows the dangers, and the track in. As the pilotage will mainly depend on the eye, and judgment of the depth over coral patches—which, however, should not be trusted without very great experience—we may add to former remarks, that when running with the wind aft, and the small clouds moving slowly, called by the pilots “flyers,” he will be very apt to be deceived by their reflection on the water over the clear white sandy bottom, having all the appearance of a rocky shoal. It will, however, always be prudent to avoid a dark spot.

Pear cut, the only other opening, is about 28 miles north-eastward of Man-of-war cay between Pear and Nobush cays, but it is only fit for small coasters, which find a passage thence along the south side of Exuma, and through the sand bore channels into the Tongue of the ocean.

LONG ISLAND.

This island is 57 miles long in a S.E. by S. and N.W. by N. direction, and at the south end, which is about the broadest part, it is $3\frac{1}{2}$ miles across, but in several places farther north it is scarcely a mile wide. From south point, the western shore trends N.N.W. for about 14 miles, and then bends round westward, forming an extensive bay. The bank extends from $1\frac{1}{2}$ to 4 miles off this part of the shore, and good anchorage will be found any-

where with the prevailing easterly winds. H.M.S. *Pert* in 1876 anchored in 7 fathoms, with South point bearing S.E. $\frac{1}{2}$ E., from which position breakers and a long low sandy point was observed running off from South point. The most convenient position for communicating with Clarence settlement is with Stephenson rock bearing N.W. by W., about 4 miles, in 7 or 8 fathoms water, $2\frac{1}{2}$ miles off shore, where there will be room to weigh, should the wind veer to the westward. The above rock is 25 feet high, and lies about $1\frac{1}{2}$ miles from the shore, and N.W. 17 miles from South point. The population of this island in 1857 amounted to 1,600.

Water.—Abreast Stephenson rock there is a well of excellent water near the beach.

Clarence harbour.*—About $1\frac{1}{2}$ miles N.E. of South point there are some conspicuous white cliffs about 50 feet high, and from thence the eastern shore of Long island curves slightly round, and takes a N.N.W. direction 14 miles to Clarence harbour. About 4 miles northward of South point, Mavors hill rises to a remarkable sharp peak 150 feet high, and between it and the harbour the interior is cut up by numerous salt ponds. There are about 140 persons residing along the shores of this harbour.

Clarence harbour is formed between the shore and some small low islets which extend off about $1\frac{1}{2}$ miles to the north-west. It is capable of admitting a few vessels of 13 feet draught, but being open to the northward it is much exposed, and frequently very difficult to get out of. The assistance of a pilot is necessary.

Supplies.—Wood and water may be obtained in Clarence harbour, also a small supply of beef and vegetables.

Tides.—It is high water, full and change, in Clarence harbour, at 8h. 30m.; springs rise 4 feet, neaps $2\frac{1}{2}$.

Directions.—Should a vessel be forced to run into Clarence harbour without a pilot, the following directions may be useful:—The south shore of the harbour is skirted at the back by a ridge of low hills, and on the western fall of the highest part there is the ruin of a large building, and about a mile to the north-west of it at the end of the ridge, a house. Run in with the house in line with Harbour point bearing S. by W. $\frac{1}{4}$ W., until Lark point bears S.E. by E., when haul up S.E. by S., and anchor as convenient, under the west end of Strachan cay, the northernmost of the larger islets.

The channel within is little more than a cable wide, and the outer part generally shows itself on either side by the breakers, which extend out

* See Admiralty plan :—Clarence harbour, No. 2,093, scale, $m = 4\cdot0$ inches.

2 cables from Booby rocks off the north end of Strachan cay. Being open to the N.N.W., it is by no means a desirable place in the winter months for vessels that cannot get under shelter of the cay. The cultivated salt ponds are close to the shore, very productive, and the salt is readily shipped.

Coast.—A bank of moderate depth extends out at least 4 miles to the north-east of Clarence harbour, but its exact limits have not yet been determined. From the harbour the eastern shore of Long island falls back to the westward for 5 miles, and then trends to the N.N.W., forming a deep bight, which should be avoided, as a heavy sea generally rolls in on this side of the island, and the shore is rocky and steep-to.

From the north end of the island a reef runs off half a mile, and the bank extends about a mile outside that. There are also some detached reefs off the north-west point of the island, near the edge of the bank, about a mile from the shore. Temporary anchorage will be found about $3\frac{1}{2}$ miles S.W. of the point, just within the edge of soundings, by picking out a clear spot, but be very cautious in rounding the north end of the island. From thence the bank sweeps round to the south-west towards the Exuma islands, and for about 13 or 14 miles it appears to be quite clear of danger for a space of $2\frac{1}{2}$ miles within the edge. The west side of Long island is only navigable for boats and very small coasters, who manage to pick their way across by the eye to the Jumentos cays.

Little Exuma is about 8 miles long E.S.E. and W.N.W., but very narrow and low. Off the east end are some small cays. White cay, the most distant, is 11 miles from the nearest part of Long island. The island contains about 160 inhabitants, and the chief settlement is about 3 miles from the east end, in the vicinity of a valuable salt-pond. There is anchorage off this part of the shore, but it is extremely exposed, and only visited by a few small vessels, who take a favourable opportunity to ship the salt. Those employed for this purpose generally come from Nassau, with a proper pilot on board, and no stranger should attempt to approach the island without one.

GREAT EXUMA.

This island, which is merely separated from Little Exuma by a small shallow channel, almost fordable at low water, is about 25 miles long in a N.W. by W. and S.E. by E. direction, but its breadth is irregular, varying from one to 5 miles. The south shore is generally low and swampy, and skirted by sand-banks and small cays to some distance, among which boats only can navigate at high water. The north shore is more firm and elevated, and varies from 50 to 100 feet in height.

The island contains about 2,000 inhabitants, but as there are no large cultivated salt ponds, they are scattered about, and employed in raising stock and provisions; it is consequently only visited by small coasters, that convey the produce to Nassau. The whole of the northern shore is skirted by a line of narrow woody islets and small barren rocks, to the distance of from one to $1\frac{1}{2}$ miles, and within them there are several secure harbours for vessels drawing as much as 14 or 15 feet. The channels, however, are so exceedingly narrow and intricate as to be quite impassable to strangers, and even with the assistance of a pilot there would be considerable risk in a vessel of this draught beating out. Those, however, drawing 12 feet, will not have this difficulty, as they can run in at the east end, and out at the west.

Stocking island,* the largest of the above islets on the northern shore of Great Exuma, is 3 miles in length, and near the centre there is a remarkable round hill, 100 feet high, on the summit of which is a well-built solid stone pillar, 28 feet high, which is the first object seen from the offing and an excellent guide. Under its western side small vessels may careen alongside the rocks.

The Eastern channel lies between the small low rocks, about 4 miles to the eastward of the beacon, and N. by E. of the ruins of Rolle town, which are conspicuously situated on the east end of the rising ground on Great Exuma. Man-of-war cay extends off about a mile from this part of the shore, and on its north side are the ruins of a small battery. No safe directions can be given for this channel, the pilotage depending entirely upon the eye.

The Western channel is 3 miles to the north-west of the beacon, and is much easier of access than the other. The opening between Conch and Channel cays is a mile wide, and serves to point it out, for the low small rocks lying between Stocking island and the former cay are close together. The entrance, however, is barred across, leaving a small cut 2 cables wide close up to the reef which runs off about 2 cables from Conch cay; 21 feet may be carried through this cut into an anchorage with 5 fathoms water, within a cable of the south-west side of the above reef. It is, however, scarcely safe in the winter season, as it is quite exposed to north-westers.

The mark to cross the bar is Industry tree (a remarkable large tree, standing on the summit of the highest hill on this part of the shore), in line with the east side of some small low black rocks, named Smith cays, lying under it, a short distance from the land, bearing S. by W. $\frac{1}{4}$ W., but

* See Admiralty plan:—Harbours of Great Exuma with view, No. 1,474, scale, $m = 2\cdot5$ inches.

haul up quickly when within Conch reef, for the space is very confined. As before stated, vessels of 11 and even 12 feet may proceed as far as they like to the eastward, provided they take high water to cross the flats westward of the beacon. All these outer cays lie within about half a mile of the edge of the bank, commencing nearly abreast the middle of Little Exuma.

Exuma sound.*—From Great Exuma harbour a narrow range of similar small low cays and rocks fringes the Bahama bank in a N.W. direction nearly 100 miles, when the edge sweeps round to the eastward and south-east, to the south end of Eleuthera island, forming Exuma sound.

There are several small intricate openings between the cays, leading on to the bank, the first of which, after passing Great Exuma island, is Galliot cut.

Adderley cay lies about 25 miles to the north-west of the beacon on Stocking island, and about three-quarters of a mile from the north-west end of Lee Stocking island. A stone beacon, 30 feet high, (10 feet of the middle part being *red*, the upper and lower parts *white*,) stands on the cay, to the southward of which there is a channel and harbour for small craft. There is a well of good water on the west end of Lee Stocking island, and a cultivated salt pond on Norman pond cay, westward of it.

Galliot cut lies 35 miles to the north-west of the beacon on Stocking island, but the opening is so difficult to make out, so narrow and intricate, and the tides rush through it with such velocity, that it is seldom used by the smallest craft.

Conch cut is 28 miles to the north-west of Galliot cut, and almost equally difficult to recognize, from the similarity in appearance of the adjacent cays, which are from 30 to 50 feet high. It has, however, more water, and is more easily piloted, but still only adapted to small, handy, fore-and-aft-coasters.

Wide opening,† about 10 miles farther north-west, is more readily recognized, by the greater distance between the larger cays, which are here 50 feet high, and about 3 miles apart, forming a bight to the W.N.W. With the assistance of a pilot, a vessel of 10 feet draught may safely use this channel, and run across to the Tongue of the ocean, about 30 miles westward; or under the lee of the cays, and round the east end of New Providence into Nassau.

* See Admiralty chart :—Great Bahama bank, Sheet 4, from Exuma to New Providence, No. 2,077, scale, $m = 0.2$ of an inch.

† See Admiralty plan :—Wide opening, No. 2,100, scale, $m = 2.7$ inches; Wax cay cut, No. 1,495, scale, $m = 6$ inches; Highborn cut, No. 1,717, scale, $m = 3$ inches; and Ship channel, No. 1,509, scale, $m = 3$ inches.

From Cistern cay, on the north-west side of this opening, the range takes a N. by W. $\frac{1}{2}$ W. direction, and becomes somewhat more elevated.

Wax cay cut, about 10 miles northward of Wide opening, has the same depth, but is very narrow and intricate. The channel lies close to the rocks on the south side and in the narrowest part it is only a cable wide. Wax cay, on the north side of the cut, is 93 feet high, while those to the southward are only 50 and 60 feet, which serves to point it out. The bank here extends out three-quarters of a mile from the islands.

Highborn cut, 10 miles northward of Wax cay cut, is a much better opening to run through, but extremely difficult to beat out of. It is easily recognized by Highborn cay, which bounds the south side of the channel, being the highest of the whole range. The tides run through this cut at the rate of 3 knots at springs.

Ship channel, 8 miles farther northward, is the northernmost and by far the best of all the above openings, and lies W. by N. $\frac{3}{4}$ N. 38 miles from the south end of Eleuthera. At the south end of Ship channel cay, which bounds the south side of the channel and has a small beacon on it, there are some conspicuous sand cliffs, which with Highborn cay are a good guide for the opening. The islets on the north side of the channel are very low barren rocks. As the opening is approached an inner range of small cays, about 30 feet high, the northernmost being a bold black rock, will be observed at some distance within the outer islets. A stone beacon 50 feet high, upper half *red*, lower half *white*, stands on North rock, which lies half a cable southward of the Mushroom, the northern rock, and 30 feet above low water.

With sufficient local knowledge there will be no difficulty in running in to this opening by bringing the above beacon to bear W.N.W., upon which line a vessel will carry 4 fathoms water over the bar. This channel is generally used by vessels drawing not over 12 feet, bound to or from Nassau, in this direction. The ground outside and at the entrance is dark and deceptive, but the shallow part of the bar on the north side generally shows itself by strong tide rippings.

Directions.—Vessels bound to Nassau having entered Ship channel, and being about 4 cables north of Mushroom rock, should steer W. by S. 8 miles, or until they have brought the sand cliffs of Ship channel cay to bear S.E. by E. $\frac{1}{2}$ E. as the run may be influenced by the tide. The course will then be N.W. by W. $\frac{1}{2}$ W., which ought to lead across the Middle ground in 10 feet at *low* water, avoiding the small heads, which are easily seen.

Vessels drawing over 12 feet, and as much as 15, may cross the bank westward into Tongue of the ocean, and proceed to Nassau round the west

end of New Providence island. In this case, having brought the sand cliffs of Ship channel cay to bear as above, steer W.S.W. 18 miles, which course should take the vessel southward of the Yellow and White banks, and in a depth of $2\frac{1}{2}$ fathoms at low water; thence steer West 8 miles to the edge of the bank. Should the water not deepen as above, the tide will have set the vessel too far northward, and she must haul a little more to the southward until it does so. As many small patches will be met with in the way, by no means attempt to run in the dark, or when the sun or weather prevents the shoals from being distinctly seen. A vessel may anchor anywhere, provided she has 2 feet to spare at low water.

The small islets on the north side of Ship channel terminate about 5 miles from the entrance; thence the edge of the Bahama bank sweeps round to the eastward about 20 miles, and presents no opening whatever as far as Powell point, on the west side of Eleuthera island. Here there is a channel of 10 feet at low water, noticed in page 515.

Tides.—It is high water, full and change, in Wide opening, at 8h. 0m.; in Wax cay cut, in Highborn cut, and in Ship channel, at 7h. 45m.; springs rise $4\frac{1}{2}$ feet, neaps $2\frac{1}{2}$. The tides run regularly in and out of all the above openings with great velocity, according to their breadth. In Ship channel its rate is from 2 to 3 knots, gradually decreasing as the vessel advances upon the bank.

CAT ISLAND.*

This island is somewhat in the shape of a leg and foot. The leg portion from Columbus point to the north-west end of the island, runs nearly straight N.W. $\frac{1}{2}$ N., about 42 miles; the foot or south side trends westerly about 15 miles. The breadth is from 3 to 4 miles, and its height varies from 200 to 400 feet; it is consequently the loftiest of the Bahamas; the latter height, however, is confined to a small ridge at the north-west extreme of the island. The island is very fertile and generally well cultivated; but, possessing no large salt ponds, the inhabitants are scattered over it from one end to the other.

The north-east side of Cat island, from Columbus point to Bird point, 30 miles distant, is generally rocky, bold, and steep-to; but from thence it becomes foul, and is skirted by a reef which runs round the north-west end of the island at the distance of two-thirds of a mile. There is shelter for boats within the reef, and deep soundings will be found 2 miles outside.

* See Admiralty charts, No. 2075 for South coast of Cat island, and No. 393, West Indies, sheet 2.

The features of the southern shore of the island are not quite so regular. At 11 miles W. by S. from Columbus point, the south extreme of the island terminates at some remarkable white cliffs. About $2\frac{3}{4}$ miles west of the cliffs, a dangerous reef fronts the shore, and at the distance of $1\frac{1}{2}$ miles off, sweeps eastward for nearly $7\frac{1}{2}$ miles to a remarkable bluff.* About midway between the bluff and the cliff there is a small cut which admits vessels of 12 feet draught into good shelter in port Howe. This end of the island should be avoided in the night, and very carefully approached in the day-time.

West of port Howe the land rises into a small peaked hill of some height called the Hawk's nest. Hawk's nest point underneath it is low and sandy, and a shallow spit, steep-to, extends westward from it nearly $1\frac{1}{2}$ miles. Thence the edge of the bank takes a N.W. by N. direction 30 miles, to within a short distance of Little San Salvador and about 8 miles from the west side of Cat island. It is clear as far in as the depth of 6 fathoms, and about 5 miles to the northward of Hawk's nest point there is a clear grassy bottom, with 10 fathoms, shoaling to the eastward to 3 fathoms. On the north part of the bank deep soundings will be found closer to the shore than at the south end. With Hawk's nest S.S.W. about 4 miles the depth is $3\frac{1}{4}$ fathoms dark ground.

There are two villages, called McQueen and Bight, between Hawk's nest point and Fernandez cay; approaching them, the rocky heads, which can be seen when within the four-fathom line, must be carefully avoided.

Anchorage.—Vessels bound to Bight settlement, and having passed Hawk's nest sand spit, should not attempt to cross the bank until about 4 miles northward of that sand-spit. There is a conspicuous bare patch about 2 miles south of the settlement.

H.M.S. *Griffon* anchored in 3 fathoms, about $2\frac{1}{2}$ miles distant from the settlement, with Fernandez cay bearing N.N.W. $\frac{3}{4}$ W., the magistrate's house N.E. by E., and a remarkable rock E. by N.

Little San Salvador lies S.W. about 10 miles from the north-west end of Cat island, and is 5 miles long east and west, and one mile broad. The space between is almost filled with small rocks and dry ledges, leaving a single intricate opening about $2\frac{1}{2}$ miles from Cat island, through which small coasters carry a depth of $2\frac{1}{2}$ and 3 fathoms. This island is connected with the south end of Eleuthera, which lies $9\frac{1}{2}$ miles west of it, and to the Great Bahama bank, by a ridge of soundings from one to $1\frac{1}{2}$ miles broad, on which the depths are from 9 to 14 fathoms.†

* This reef is reported to extend round Winding bay at from $\frac{1}{4}$ to $\frac{1}{2}$ mile from the shore, with a break near its west end with 15 feet water and having from 2 to 3 fathoms inside it.—Navivating officer, H.M.S. *Bullfrog*, 1884.

† See Admiralty chart, Great Bahama banks, sheet IV., No. 2077.

ELEUTHERA.*

This island is of a very irregular shape, and may be said to form the north-east elbow of the Great Bahama bank. It is moderately populated, and the soil is peculiarly adapted to the cultivation of pine apples, which are largely exported. From Eleuthera point, the south extreme of the island, a reef, which generally breaks, extends off $1\frac{1}{2}$ miles to the E.S.E. and S.E., and about half a mile to the southward of the point there is a small black rock.

Miller anchorage.—From Eleuthera point the western shore trends N.W. 16 miles to Bamboo point, and the bank extends off about a mile. About 4 miles northward of Eleuthera point, under Miller hill, which is about 60 feet high, good anchorage will be found in 7 fathoms water, just within the edge of the bank, but be careful to look out for a clear spot, and leave on the approach of a westerly wind.

Rock sound.—From Bamboo point the shore takes a N.N.W. direction $3\frac{1}{2}$ miles to Powell point, and here the island is 11 miles broad east and west; it then turns abruptly to the south-east, and round to the eastward forming Rock sound, where there is one of the largest settlements, containing about 500 inhabitants. Rock sound and rock harbour are very safe anchorages for vessels of 11 and 9 feet draught respectively the bottom being soft mud. About half a mile S. by W. $\frac{1}{2}$ W. from Powell point there is a small islet called Chub rock. To the north-westward of the point there are many shallow sand ridges, between which are channels navigable for vessels drawing less than 10 feet; those, however, above this draught, bound here for fruit or stock, generally enter on the bank from the north-west, through the Fleeming, or Douglas channels.

Tarpum bay, the next settlement on the west side of the island, is about 8 miles northward of Rock sound. Small vessels may anchor here close to the shore, protected from the westward by numerous sand bores, nearly awash at high water. There are about 500 persons at this settlement, and there are good wells bored in the rock.

Governor harbour is a small cove about 11 miles farther northward. In entering this cove keep close to the south point off which at a boat's length will be found 18 feet, to avoid a small rock having only 2 fathoms water over it, lying about half a cable off, with 3 and $3\frac{1}{4}$ fathoms between it and the shore; there is also another shoal patch with $1\frac{3}{4}$ fathoms water on it N.W. by N., 6 cables from the south point. The anchorage is

* See Admiralty chart, Great Bahama banks, sheet IV., No. 2077.

exposed to westerly winds, but with good ground tackle and proper precaution there is no danger. The best berth will be in $3\frac{1}{2}$ fathoms, with the south point bearing S.W. $\frac{1}{2}$ S. and the west end of Cupid (Levi island) cay N.W. by W. $\frac{1}{4}$ W. the holding ground is very good.

The cay on the south side of the harbour is known locally as Cupid cay, the one on the north side as Levi island, and the bluff inside it as White bluff.

Water.—There are some wells near the opposite shore about $1\frac{1}{2}$ miles from the village, but the water is not very good. About a mile to the northward of this, near the beach, is James cistern, where after heavy rains abundance of good water may be obtained, but it is scarce in the dry season.

Pitman cove, generally called the Cove, is the northernmost settlement on Eleuthera, about 20 miles from Governor harbour. This part of the shore is bold and steep-to, and a vessel may anchor in $4\frac{1}{2}$ or 5 fathoms within half a mile of it.

Directions.—Vessels bound to any of the above settlements from the westward will not have less than 21 feet water across northward of the Middle ground, on a clear sandy bottom. The depth is 15 feet on the northern edge of the Middle ground, about 4 miles from Finley cay, which is very low and sandy, and in beating up the lead must be the guide. The channel between the middle ground and the low rocks to the north-west is about 4 miles wide in the narrowest part, abreast the Samphire cays, whence it gradually opens out to the north-east. A vessel will have 19 feet water as far to the south-east,—between the middle ground and Eleuthera,—as Tarpum bay, and 14 feet to the north-west to within a short distance of the Glass window, and with generally good holding ground.

Tides.—It is high water, full and change, on the west side of Eleuthera, at 9h. 0m., and the rise and fall is from $2\frac{1}{2}$ to 3 feet; but there is scarcely any tidal stream until within 5 or 6 miles of the openings.

East side of Eleuthera.—From Eleuthera point, the eastern shore trends northerly 31 miles to Palmetto point, and is slightly indented. It is foul almost the whole way, and closely skirted by a reef with deep soundings from about half to a mile outside it. Close to the southward of Palmetto point there is a small opening through the reef carrying a depth of 8 feet, leading into a little inlet called Savanna sound, where there is also a settlement containing about 300 inhabitants; there is here a small but good salt pond, but the fresh water is not good, the well being used by cattle. Thence the coast trends N.W. by W. 17 miles to James point. To the north-east of Palmetto point there are 10 fathoms

water about $2\frac{1}{2}$ miles off, but thence the edge gradually approaches the shore to the distance of a mile.

At James point the reef runs off a mile to the north-east, and a small spit of the bank $1\frac{1}{2}$ miles beyond it. All this part of the island is low, with some sand-hills from 30 to 50 feet high, and is scarcely a mile broad. From James point the coast trends W.N.W. 14 miles to the Cow and Bull, two very remarkable round-headed black rocks 20 or 30 feet high, at the south end of a very low narrow neck of land which nearly divides the island into two parts. A short distance to the north-west of these rocks, the sea has pierced a large arch through the low flat ridge of cliffs, called the Glass window, which is also remarkable when seen from the east or west.

Harbour island.—From the Glass window the coast trends N.N.W. $2\frac{1}{2}$ miles, and is composed of low rocky cliffs steep-to. It then bends round to the westward, forming deep coves and bays all the way to the north end of the island, and is fronted by a range of small islets, which sweep round to the northward and westward, within which there is good shelter for small coasters drawing 8 or 9 feet. The southernmost of these islets, named Harbour island, is 3 miles long north and south, but scarcely half a mile broad; the east side is composed of sand-hills about 50 feet high, and on the west side is Dunmore town, which is considered the healthiest spot in the Bahamas; the south end is about the same height, but rocky and woody, and is separated from the main by a narrow channel, through which vessels of 12 feet draught may enter into a small but well-sheltered anchorage named East harbour.

East harbour is barred across; in heavy weather the bar breaks, but there is not less than 14 feet on it at low water. The opening is easily recognized by the sand-hills to the northward, and the ridge of bold rocky cliffs to the north-west of the Cow and Bull. Bring the opening to bear S.W. (or S.W. by S.), and run boldly in, bordering towards Harbour island, and anchor just within the bar in $3\frac{1}{2}$ fathoms water, with the south end of that island bearing N.N.W. The tide runs through with great rapidity, and it is therefore necessary to moor. A vessel will be prevented from going farther in by an extensive shallow sand-flat, which separates it from the anchorage off the town, and being exposed to the north-east it is difficult to get out of, and consequently seldom visited. It would be found, however, a safe refuge for a vessel caught incautiously in the bight between it and James point.

Vessels entering this harbour by South bar should steer for the entrance on a course S.W. by S., and keep near the north side of the channel, as the shoal extends from the south shore nearly half-way across.

The least water obtained in the *Griffon* when entering (1883) was 17 feet at nearly low water; there is always a swell on the bar, even in light winds, and the tides run strongly.

Anchorage was obtained in $4\frac{3}{4}$ fathoms, with Dunmore point bearing N. by W., and South entrance point E. by N. $\frac{1}{2}$ N.

West harbour.—From the north end of Harbour island, a chain of small low cays, fringed by a reef for about half a mile, sweeps round for about 5 miles to Bridge point, the north extreme of Eleuthera. The entrance for small vessels into the western harbour is through a small intricate cut, close off the point; but it requires the aid of a pilot. This end of Eleuthera rises from the shore to the height of 130 feet, 4 miles to the southward of Bridge point.

N.E. bank.—From Man island, which forms the elbow of the above cays, a spit or tongue of bank about $2\frac{1}{2}$ miles broad, with 12 and 14 fathoms water on it, runs off 5 miles to the north-east, and with careful attention to the lead it serves as a valuable safeguard in approaching at night this very dangerous neighbourhood; but the latitude is the great point to be attended to here, and if not certain of this, a wide berth should be given to this locality, which is generally the landfall for vessels bound into the North-East Providence channel.

Egg reef.*—From Bridge point a chain of small islands extends to the W.S.W. for nearly 10 miles, bounded on the north by a dangerous reef to the distance of about 2 miles. The northern pitch of this reef lies W. $\frac{1}{2}$ N. 4 miles from Bridge point, and N.E. $\frac{3}{4}$ N. $5\frac{1}{4}$ miles from the paps on Royal island, which, from this direction, are seen nearly in one. From this pitch another narrow spit of bank, equally valuable as a guide in the night as the N.E. bank, if proper attention be paid to the latitude and lead, runs off $3\frac{1}{2}$ miles to the northward; it is about 2 miles broad, with a depth of from 7 to 12 fathoms on it.

The west end or elbow of the reef terminates W. by N. $2\frac{1}{2}$ miles from the paps, and N.W. $\frac{1}{2}$ N. nearly 2 miles from the hill on Egg island. Along the north-west side the depths are 9 and 10 fathoms at three-quarters of a mile from the reef, but at the elbow the edge of soundings comes close home; this neighbourhood is very dangerous, and requires the greatest attention. George, Charles, and Russell islands, the easternmost of this chain, lie so close together, that from the northward they appear as one island $3\frac{1}{2}$ miles in length east and west.

George island, the easternmost of the above group, is separated from Eleuthera by a narrow channel. On the sandy point at the east end

* See Admiralty plan:—Egg island to Eleuthera, with plan of Royal island harbour, No. 2,098, scale, $m = 1.8$ inches.

of the island there is a small village of fishermen. Russell island is woody, and about 85 feet high.

ROYAL ISLAND, the next and the largest of the group, is $4\frac{1}{2}$ miles in length E.N.E. and W.S.W., but very narrow. It lies parallel to and within Egg reef. About three-quarters of a mile to the south-west of the centre of the island are two remarkable woody paps or hummocks close together, and about 75 feet high. On the south side of the island there is a snug little harbour for small craft drawing less than 9 feet. In the middle of the entrance lie two small dry rocks, and on entering, it will be better to pass close to either of the points, east or west of them. The best berth is with the house bearing N. by E. or N.N.E., in 10 feet at low water. About $1\frac{1}{4}$ miles South of the harbour there is a narrow rocky ledge nearly dry, and in working up from the south-west it will be better to keep to the northward of it.

Water.—A well of good water will be found near the house on Royal island.

Great Egg island is a wooded islet, about a mile long N.N.E. and S.S.W., a quarter of a mile broad, and 67 feet high with a conspicuous white house at its centre. The opening between it and Royal island is little more than a cable across, and the elbow of Egg reef terminates near the middle of the islet.

Little Egg island, the westernmost of the chain, and lying about 2 cables southward of the above, is a narrow rocky islet, less than a quarter of a mile long and only 15 feet high. The edge of the bank comes within three-quarters of a mile to the westward of it.

Anchorage.—There is anchorage in 8 fathoms water on the edge of the bank, with Great Egg hill in one with Little Egg N.N.E., about a mile from the latter; but the holding ground is not good, and a heavy swell generally rolls in round the elbow of the reef. Vessels drawing under 16 feet may go so far in as to bring Little Egg to bear W.N.W., and the paps of Royal island N. $\frac{1}{2}$ E., where they will have 3 fathoms at low water. In beating up, they may stand towards the cays by the lead, observing that the south end of Little Egg is foul to the distance of a long half mile; when standing to the southward be careful when approaching S.W. reef.

S.W. reef* lies close to the edge of soundings, and its north end bears about S.E. by S. $1\frac{1}{2}$ miles from Little Egg island; it is 2 miles long north and south, and although nearly dry it seldom breaks. About $1\frac{1}{2}$ miles

* See Admiralty chart, No. 2077, Great Bahama banks.

S. by E. from the south end of the reef is Current rock, a low black rocky islet; and 2 miles southward of the latter is the north end of Pimlico islands.

Tides.—It is high water, full and change, at Egg islands, at 7h. 45m.; springs rise $3\frac{1}{2}$ feet.

Pimlico islands are a range of small, barren, low, rocky islets, extending 4 miles in a S.S.W. direction; and about 2 miles farther on are Six shilling cays, with the Quintus rocks $1\frac{1}{2}$ miles to the south-east of them. These cays may be readily recognized from the others by the beacons on them. About 2 miles within Pimlico islands is Current island, which is only separated from the south-west end of Eleuthera by a narrow channel, called Current cut, through which the tide rushes with the force of a rapid.

Fleeming or Six Shilling channel* lies 14 miles to the southward of Little Egg island, and N.E. by E. $\frac{1}{2}$ E. 25 miles from Nassau lighthouse. The opening between Six shilling and Samphire cays, to the south-west, is 6 miles wide, but the channel is only about $1\frac{1}{2}$ miles in breadth, and lies about a mile south-westward of the former islets. It is capable of admitting vessels of 20 feet draught without much difficulty, provided they have some little knowledge of the locality.

Beacons.—On the south-westernmost of Six shilling cays is the outer or Shannon beacon, triangular-shaped, 50 feet high and visible 7 or 8 miles. The inner beacons on Quintus rocks are two pole beacons on the southern rock; they bear N. by E. $\frac{3}{4}$ E. and S. by W. $\frac{3}{4}$ W. from each other, and the southernmost lies E. by S. $1\frac{1}{2}$ miles from Shannon beacon.

Directions.—When approaching Fleeming channel from the northward, run down close to the edge of the bank, which is about a mile from the cays, and enter upon soundings with Shannon beacon bearing E. $\frac{3}{4}$ S., when Quintus beacons will be just open south of it, and then steer S.E. This course should lead about a mile south-westward of the Shannon, and when it bears N. $\frac{3}{4}$ W. bear up S.S.W., which will lead into Douglas road or New anchorage. There are many small heads in the way, but they may be easily seen from aloft.

As the tides run right across the inner part of the channel, the flood to the S.E., the ebb to the N.W., at the rate of 2 or 3 knots, steer accordingly so as to pass 2 cables to the eastward of a *black* buoy with a flag moored S.E. by E. $\frac{1}{2}$ E. 2 miles from Upper Samphire cay, and S.W. by S. $6\frac{1}{4}$ miles from the Quintus poles; these latter, therefore, will be a good guide.

* See Admiralty plans :—Fleeming or Six shilling channel, No. 405, scale, $m = 1.2$ inches.

The buoy lies in 2 fathoms water, at the inner and narrowest part of the channel, which is little more than a mile wide. A short distance to the north-east of the buoy there is a small ledge of 14 feet, called the Middle ground, with 21 feet on either side, but it had better be left to the eastward.*

In beating out, when the buoy eastward of Samphire cay bears southward of S.W. by W., do not stand farther eastward than to bring Quintus beacons in line, and to the westward keep Pimlico islands open westward of Six shilling cays. The edge of the shoal ground on either side of the channel, however, may be seen from aloft. A vessel may anchor in the channel, or take up a convenient berth for quitting, about a mile S.W. of Quintus rocks, but she will be exposed to the westward. The shoal ground extending southward from the Shannon beacon cay should be carefully avoided.

Tides.—It is high water, full and change, in Fleeming channel, at 9h. 0m.; springs rise $3\frac{1}{2}$ feet, neaps $1\frac{1}{2}$ feet.

Douglas channel,† about 12 miles S.W. of the Fleeming, is similarly distinguished by two pole beacons on small black rocks, in the centre of the opening, which is about $1\frac{1}{2}$ miles wide between Booby island and the east end of Rose island. It is navigable for vessels of 20 feet draught, but it is so narrow and tortuous, and the tides so rapid, that a pilot is absolutely necessary. However, in the event of a vessel being forced to run in without this assistance, the following directions may be useful :—

Directions.—Wait for the flood tide, and strike the edge of the bank with the beacons in one S.E. $\frac{3}{4}$ E., which line will lead close to the westward of Booby island ledge, and when the small pile of stones on the west end of that island bears E. $\frac{1}{2}$ N. haul up about E. by S. $\frac{1}{2}$ S., so as to pass to windward of the *black* buoy on the north-east edge of the shoal ground of Douglas rocks. It is seldom, however, that the wind will allow a vessel to do this; but the tide is so strong under the lee, that by proper attention she may shoot through the narrows, here only about $1\frac{1}{2}$ cables wide. Should she be forced to tack, it had better be done under the west side of Douglas rocks, where they are steep-to. If under 14 feet draught she may shoot in to the southward of the beacons, but there is a very dangerous small rock, with 8 feet water on it, and 4 fathoms around, in the middle of the opening between Douglas and South channel rocks, which, on account of the strong rippings over the dark bar that runs across, is not seen.

* The position of these buoys are not to be depended on.

† See Admiralty plan :—No. 406, Douglas Road, scale, $m = 2\cdot0$ inches.

If it be determined to take the latter channel, a boat had better be placed over this rock, for the tide runs here so strong that without a good commanding breeze the vessel will be scarcely under control.

Having passed the buoy of Douglas passage, a S.E. $\frac{1}{2}$ S. course will lead between Turtle head and the *black* buoy off the north end of Hook sand, whence the course may be gradually shaped to S.W. for Douglas road* or Cochrane anchorage guided by the eye and the chart.

A convenient berth, about 8 miles from Nassau, will be found in about 4 fathoms water, sand and marl, with Potter cay nearly in one with Montague fort on New Providence W. by N., and the house on Rose island N. $\frac{1}{2}$ W. An anchorage may also be taken up a short distance within Douglas channel in Shoe hole road in 4 or $4\frac{1}{2}$ fathoms, but it is not good holding ground, and in a strong norther vessels are liable to drag.

Water.—There are wells of excellent water near the house on Rose island, but they are difficult to get at.

Tides.—It is high water, full and change, in Douglas channel, at 8h. 30m.; springs rise 4 feet, neaps $2\frac{1}{2}$ feet.

Hanover sound,† at the west end of Rose island, between Salt cay and Athol island, is a snug anchorage for two or three vessels drawing under 18 feet. The entrance, however, is only about a cable wide, and being open to the north-east it is difficult for a sailing vessel to get out, and in the winter season she may be detained for a long time. The leading mark in, is a remarkable conical bush near the Creek village on New Providence, just open east of the quarantine officer's house (*white*) on Athol island S.S.W. $\frac{3}{4}$ W.

LIGHT.—See page 526.

After rounding the end of Rose island ledge, which will be seen from aloft, haul up South and anchor with the west end of Rose island rocks N.E.; but a pilot is necessary for all these intricate openings. In running down from the north-east, bear in mind that the north side of Rose island is skirted by small low rocky islets and shallow coral patches to the distance of $1\frac{1}{2}$ miles, and the edge of the bank is about three-quarters of a mile beyond them.

Salt cay anchorage, at the west end of Salt cay, is also a snug spot for two or three vessels of 14 or 15 feet draught. The entrance lies $1\frac{3}{4}$ cables northward of Pork fish rocks, on the north side of Hog island, between them and a rocky ledge extending off from the west end of Salt cay, the western and southern edges of which are marked by

* See Admiralty plan:—Douglas road, No. 406, scale, $m = 2.0$ inches.

† See Admiralty plan:—Salt cay anchorage and Hanover sound, No. 1,435, scale, $m = 5.0$ inches.

two *black* spar buoys, but they cannot be depended upon; this channel requires a leading wind. Nassau lighthouse on with the centre of Pork fish rock leads up to the anchorage; the tide runs across the fair-way very strongly.

Vessels leaving Salt cay anchorage after strong East or N.E. winds will probably meet with rollers on the bar, which will cause her to pitch heavily, even after the wind has subsided for two or three days, for this due allowance should be made according to draught of water.*

Tides.—It is high water, full and change, in Hanover sound, at 8h. 15m.; springs rise 4 feet, neaps 3 feet.

NEW PROVIDENCE.

This island† being the seat of government, and possessing a safe harbour for a few vessels of 15 feet draught, is the most important of the Bahamas. The island is oval-shaped, $16\frac{1}{2}$ miles long east and west, and $6\frac{1}{4}$ miles at its broadest part. (A narrow ridge of wooded hills, from 80 to 120 feet high, skirts the northern shore almost the whole way.) The town of Nassau stands on the northern slope of the ridge about $5\frac{1}{2}$ miles from the east end of the island, and is one of the most picturesque and well-built towns in the West Indies; it affords good water and supplies of all descriptions, and convenient means for heaving down and repairing vessels. (At Cave point, about $6\frac{1}{2}$ miles from the west end, a narrow fork of the ridge, called the Blue hills, from 100 to 130 feet high, branches off towards the centre of the island,) and north and south of it are large lakes of brackish water, from 6 to 12 feet deep, which are slightly influenced by the tides. The island has a population of 43,521.

The southern portion of the island is low, and covered in great part with extensive pine barrens or woods; the shore is generally sandy and swampy, and shallow flat sands run off from it to some distance. An excellent carriage road runs all along the northern shore, and another crosses the island from the town to the Blue hills. The north side is skirted by several small low cays, covered with brushwood, from half a mile to a mile within the edge of soundings.

Hog island, the easternmost of these cays, is $3\frac{1}{2}$ miles long east and west, and bounds the north side of Nassau harbour; the western end gradually falls from low sand-hills to a flat rocky point.

Silver cay lies 6 cables westward of Hog island, and half a mile from the shore of New Providence. About 2 cables farther westward is Long cay, and $1\frac{1}{2}$ miles beyond this is North cay. There is a navigable

* Captain H.M.S. *Phœnix*, 1881.

† See Admiralty chart:—New Providence island, No. 1,489, scale, $m = 2\cdot0$ inches.

opening for small vessels between the two latter cays ; and also an opening through the foul ground about a mile to the westward of North cay, leading into a small anchorage for vessels of light draught, but it is seldom used. The shore to the westward of the cays should not be approached within the distance of a mile.

LIGHT.—Nearly a cable within the extreme west end of Hog island is a conical white stone lighthouse, 58 feet high, which exhibits a *fixed* white light, 68 feet above high water. The light is visible in all directions except between the bearings of N.N.E. and N.N.W. $\frac{1}{2}$ W., and may be seen 10 miles off, but it is only intended for a harbour light.*

A *red* light is also shown from a flagstaff E. $\frac{3}{4}$ S. 69 yards from the lighthouse, when the bar of the harbour is dangerous or impassable. This light is hid by the lighthouse on the above bearing.

NASSAU HARBOUR.†—The entrance to this harbour lies between Hog island and Silver cay ; but between them a rocky bar runs across, which breaks heavily with strong north-west and north winds, and is sometimes impassable for several days. The greatest depth at low-water springs is 17 feet, but this is only in a space not 50 yards wide, and, as stated before, vessels drawing over 15 feet cannot get in with safety. The depth of water in this harbour is reported to be decreasing ; it is not advisable for vessels drawing more than 13 feet to attempt to enter ; the holding ground at the anchorage is not good.

Directions.—When bound to Nassau from the north or north-east a wide berth should be given to the north-east elbow of the Little Bahama bank, until the parallel of $26^{\circ} 30' N.$ is reached. Approaching from the eastward, the latitude of $25^{\circ} 45' N.$ should be most carefully maintained until either the north end of Eleuthera, which may be seen about 12 miles off, is sighted, or the Abaco lighthouse, which is visible in clear weather 16 miles.

The current, as the Bahamas are approached from these points, and also from the east and south-east, generally runs to the north-west but not strong. To the northward of Eleuthera, however, a strong set in the opposite direction will sometimes be found after north-west and north winds, and probably after fine weather, on the increase of the moon, but it will be safer not to depend on this. Should Eleuthera be made, haul round Egg reef at a distance of 3 or 4 miles ; and when Great Egg island bears East, the course will be about S.W. by S., and the distance nearly 32 miles to Nassau lighthouse.

The first objects seen when approaching the harbour will be forts Fin-castle and Charlotte, and soon after Government house, a remarkable large

* It is stated that this light is seen farther than 10 miles.

† See Admiralty plan :—Nassau harbour, No. 1452, scale, $m = 17\cdot0$ inches.

square building on the top of the ridge, between them. When near the entrance a stone obelisk will be observed on the hill, a short distance eastward of fort Charlotte—which is the westernmost fort; and when the lighthouse bears south distant about half a mile, a small low rock will be opened out close under the land, called Tony rock, on which is a pole beacon with a triangular frame on the top. The obelisk and beacon in one, (or, better, the beacon open a little eastward of the obelisk,) bearing S. $\frac{3}{4}$ W., will lead over the deepest part of the bar, westward of a *red* buoy* on the extremity of the spit off Hog island; when the flagstaff on the west end of Hog island comes in line with the lighthouse bearing E. by N. haul sharp up for the western side of the Cathedral tower, which kept in line with the apex of the roof of the eastern barracks, bearing S.E. $\frac{1}{4}$ E., leads in clear of the Sand heads; bearing in mind that the flood will set the vessel strong towards the sand ridges on the east side of the channel.

When the cupola of the public library is in line with a small look-out house on the ridge, a little eastward of fort Fincastle, haul up on this line, and moor with Tony beacon W. $\frac{1}{2}$ N. abreast the Ordnance yard, or barracks, as most convenient. With a vessel of light draught, the northern† part of the harbour affords the best shelter and holding ground.

These directions can only be of use to those fully acquainted with the place, except in a case of the greatest emergency. Handy vessels that can insure staying may beat in, but this must be done entirely by the eye. Every confidence may be placed in the pilots, who are always at hand. Vessels of 14 or 15 feet draught had better moor head and stern with their heads to the westward, and the best bowers to the eastward, being careful not to swing over their anchors. In the summer season, after the period of north-westers, it will perhaps be more convenient to have the vessel's head to the eastward.

Approaching the harbour with a northerly wind, should the bar be dangerous to cross, a *red* flag will be hoisted on the signal-staff, west of the lighthouse. In this case it will be more prudent to proceed to the Douglas channel, page 521, or to the anchorage at the south-west end of the island. Should the bar be passable, but too dangerous for a boat to get out, a *white* flag will be hoisted, and the pilot boat will be seen, waiting just within the breakers, showing a flag *red and white* horizontally. In this case cross the bar upon the first leading mark, the beacon and obelisk nearly in line, and when the flagstaff comes on with the lighthouse E. by N. steer for the boat

* Too much reliance must not be placed on the buoys, as they are frequently out of position.

† The part between the magazine and patent slip is known locally as Hurricane hole, and is the only safe anchorage during hurricanes. Navigating officer H.M.S. *Bullfrog*, 1884.

and receive the pilot. This, however, is a dangerous course for a vessel of heavy draught; and, except in a case of great urgency, it will be far more prudent to act as above stated.

Should a strong north-wester overtake a vessel at the entrance of either of the Providence channels, it will perhaps be better to remain under the lee of the south end of Abaco, or anchor under the west side of the Hole in the wall, and wait until the wind moderates and the sea goes down. It may still continue to blow hard as the wind draws round to the north-east, but when it reaches this quarter the sea generally subsides on the bar in a short time. A good sheltered berth will be found under Abaco in 11 fathoms water, about three-quarters of a mile from the shore, with the lighthouse E. by N. $\frac{1}{2}$ N.

Outer anchorages.—Vessels merely wishing to communicate with Nassau, or with the wind to the southward, will find a temporary anchorage off the north side of Hog island, in about 8 fathoms, on the edge of the bank, with Government house just open to the eastward of Christ church S. by W. $\frac{3}{4}$ W. Or, nearer the harbour with Tony beacon and the obelisk in line, and the lighthouse bearing about S.S.E.. These anchorages must, however, be approached under easy sail, and care must be taken not to shoot too far in; in the winter months be prepared to quit the moment the wind threatens a change.

Eastern channel.—Vessels under 11 feet draught may enter Nassau harbour from Cochrane anchorage (page 522), but this is only to be done by the eye. A depth of 9 feet may be carried at low water over the eastern flats off fort Montague, and the channel lies close under the south sides of Athol and Hog islands. The eastern extreme of the reef extending from Potter cay to abreast fort Montague is marked by a *white* spar buoy.

LIGHT.—A *fixed* white light is exhibited from the cupola of the quarantine officer's dwelling on Athol island, and shews over the Eastern channel between the bearings of W. by N. $\frac{3}{4}$ N. and N.N.W. $\frac{1}{4}$ W.; visible in clear weather about 8 miles.

Tides.—It is high water, full and change, in Nassau harbour, at 7h. 30m.; springs rise 4 feet, neaps 3 feet. The floods sets to the eastward, and the ebb to the westward, about a knot an hour, and at times with greater strength.

Supplies.—Good water may be obtained at \$4 per ton; that in the wells is sometimes brackish. There is no coal at Nassau for shipping; provisions are of moderate price.

Patent slip.—There is a patent slip on Hog island, capable of lifting vessels of 700 tons; depth on fore part of cradle when let down, 9 feet. Vessels over 12 feet draught cannot get to the place where the slip is built; general repairs can be effected.

North-west coast.—From Nassau the shore trends westerly for $4\frac{1}{2}$ miles, then W.S.W. $4\frac{1}{4}$ miles, and thence with a slight southerly curve to the south-west for $3\frac{1}{4}$ miles to Lyford cay, which forms the northern part of West bay. The whole of this coast is fronted by cays and reefs, and the edge of the bank is about a mile off shore.

West bay.—The west end of the island forms a small bay which affords good shelter from all points but the West, to small craft drawing 7 feet water. Directly off the middle of the entrance, nearly a mile from either point, is Goulding cay, a narrow low rocky islet about 3 cables in length east and west, and steep-to on the south side; but a reef, which generally breaks, extends off a quarter of a mile to the north-west from its west end, and there are deep soundings about 2 cables beyond it. The leading mark into the bay, north-east of the cay, is the cocoa-nut trees a little open south of Clifton bluff, hauling into the bay when about mid-channel between the cay and Simms point.

South-west bay.—The south-west end of New Providence is formed of remarkable perpendicular white cliffs, about 30 feet high. The best anchorage will be found with Clifton bluff N.W. $\frac{1}{2}$ N., and the south extreme of the island E. $\frac{1}{2}$ S., in $4\frac{1}{2}$ fathoms water, just on the edge of the bank, and about half a mile off shore. A vessel may go further in, according to her draught, guided by the lead. Should she have to work up, be very careful to avoid a small rocky patch of 11 feet, lying close to the edge of the bank, with the bluff bearing N.N.W. $\frac{1}{2}$ W. nearly 2 miles, and Conch rock E. by S. The latter, however, is only about 8 feet high, and so small that it will scarcely be visible from the deck of a small vessel. Anchorage will also be found southward of this patch in 5 fathoms with the bluff N.N.W. $\frac{1}{2}$ W., and the above rock East.

S.W. reef.—This very dangerous rocky ledge lies on the edge of the bank, S. by E. $\frac{1}{4}$ E. 7 miles from Clifton bluff. It is nearly awash, and the ground is foul for one mile to the northward of it.

TONGUE OF THE OCEAN.*

This most remarkable inlet, or estuary of ocean water, is about 100 miles in length north and south, with a bight to the eastward which comes within about 20 miles of the Exuma cays. This latter part is about 30 miles wide, but the northern portion, between the west end of New Providence and Green cay is only from about 15 to 20 miles across to Andros island.

Green cay.—From S.W. reef, the edge of the Bahama bank takes a S.E. by S. direction 28 miles, and is very foul; there being several rocky heads nearly awash, it is dangerous to approach in the night. Thence it

* See Admiralty chart, No. 2,077, Great Bahama banks, sheet 4.

trends S. $\frac{3}{4}$ E. 28 miles farther to Green cay; this part is pretty free of rocky patches, but it is so wall-sided that there are in some places only $3\frac{1}{2}$ fathoms on the edge of the bank.

Green cay is about a mile in extent, and near its centre 60 feet high. Near the north-west end there are some wells of good water. Anchorage will be found about a mile to the southward of the cay, but it requires very great care not to shoot too far in from the edge of the bank, which is very steep with dark foul bottom. Green cay is chiefly noted as a breeding place for innumerable white crowned blue pigeons, which may be shot in any number. There is a tract of marsh land which gives off an offensive effluvia. There are some cattle on the cay, and two men reside on it to take care of them. H.M.S. *Flamingo* in 1877 anchored in 15 fathoms about 300 yards off the sand spit which bore N.N.E. $\frac{1}{2}$ E. H.M.S. *Bullfinch* anchored off its N.W. end in 3 fathoms in 1880. H.M.S. *Fantome* reports the island is well wooded. About $6\frac{1}{2}$ miles S.E. of the cay there are some small barren black rocks about 20 feet high, called Booby rocks. Thence the edge of the bank sweeps round to the eastward, and then to the southward, and being impassable, has received only a partial examination.

South side channels.*—It has already been noticed in page 506, when describing the channels through the Jumentos, that on the south side of Tongue of the Ocean there are numerous small channels, clearly pointed out in the present charts, two of which, 8 or 9 miles in length, named Thunder and Blossom, may be used by vessels of 14 feet draught. The navigation entirely depends upon the eye, but it is not difficult. The clear white sand ridges take a S.E. direction and commence a short distance within the edge of the bank. The depth at the north end of the entrance is from 5 to 6 fathoms, generally over dark bottom, so that the channels are well defined by the sand ridges on either side, and easily made out from aloft; but towards the inner or south-east end, the sand ridges meet across, forming a bar with from 3 to $3\frac{1}{2}$ fathoms on it, and therefore coming from the southward the true channels are not so easily discovered.

The tides run very rapidly through, and sometimes across the ridges, and the navigation is consequently not safe in the night. A vessel may anchor, however, anywhere between them.

ANDROS.

This, one of the largest of the Bahama islands,† is 90 miles long N.N.W. and S.S.E., and forms the west side of the Tongue of the Ocean. The

* See Admiralty chart :—Great Bahama bank, sheet 2, No. 2,009, scale, $m=0\cdot2$ of an inch.

† See Admiralty chart :—Great Bahama bank, sheet 1, No. 1,496, scale, $m=0\cdot2$ of an inch; and No. 2,077, sheet 4.

southern part of the island is from 18 to 20 miles broad, but near the centre, between High cay and William point, it is 40 miles across, and thence it gradually decreases in breadth to about 10 miles at the north end. The whole island is low, swampy, thickly wooded, and intersected by numerous shallow creeks, which almost cut the island into three parts at high water. Along the eastern side, however, from High cay to the southward, there is a narrow ridge of hills from 70 to 90 feet high. This shore is skirted by numerous small cays and reefs to the distance of from one to 2 miles, and being steep-to is very dangerous, particularly in the neighbourhood of High cay, where the Tongue is only 15 miles across. The western shore of the island is composed of slimy mud, like pipeclay, and is so low that in north-west gales it is overflowed to a considerable distance inland. The water is here so shallow, that in some places a boat cannot come within many miles of the shore.

There is no harbour whatever, but boats and small craft drawing 4 or 5 feet, find their way through the reefs on the eastern side of the island, into some of the creeks, for the purpose of collecting sponge, which is found in large quantities, and shipping the wood which is floated into them from the lagoons in the interior. There are but few inhabitants, and the only settlement of consequence is at Red bay near the north-west end of the island. From this end an extensive flat of sand, dry in many places at low water, runs off 12 miles to the north-west, and on it are several small islets, the northernmost of which are called Joulters cays. About 2 miles to the northward of Morgans bluff, a remarkable rocky headland forming the north-east point of the island, there is an opening in the reef, abreast a small rock called Golding cay, and in moderate weather it will admit a vessel of 9 feet draught into shelter within.

Tides.—It is high water, full and change, on the east side of Andros at 8h. 0m., on the west side, off the north end at 10h. 30m., and off the south end at 1h. 15m. The tidal streams meet in the centre of the bights, where the rise and fall is only from 12 to 18 inches, and the flood runs to the eastward through the great bight, 3 hours after high water.

N.W. channel.—From Morgans bluff, the north-east point of Andros the edge of the Bahama bank trends N.N.W. 18 miles, and then turns suddenly to the E.S.E. along the south side of Berry islands. At the head of this bight there is a narrow intricate channel between sand ridges, through which may be carried a depth of 10 feet at low water, and it is usually used by the wreckers. These small vessels leaving Nassau, generally anchor under Chub cays for the night, and arrive at the entrance of the channel by sunrise, in order to be able to see the numerous heads which skirt the edge of the bank for about $1\frac{1}{2}$ miles inwards before

reaching the sand bores. The clearest route will be found by striking soundings with Blackwood bush, (a small low bushy cay, the westernmost of the Berry islands,) bearing E. by N. $\frac{1}{2}$ N. 5 miles.

BERRY ISLANDS are a group of small narrow wooded cays, from 50 to 60 feet high, which from Blackwood bush cay, sweep round to the eastward, forming nearly a semicircle of 23 miles in diameter; there are but few inhabitants, and supplies are scarce. The western side is quite blocked up by shallow sand-banks, but to the eastward the islets are skirted by a flat bank of soundings, having from 10 to 14 fathoms water, extending off from 5 to 8 miles, and is a good guide in the night. At $1\frac{1}{2}$ miles E.S.E. from Blackwood bush, there is a small low islet called Rum cay. The bank runs out $1\frac{1}{2}$ miles between these cays, and the ground is very foul. At $6\frac{1}{2}$ miles farther on in the same direction, is South Stirrup cay, which is covered with trees, growing out of a swamp, to the height of 35 feet. Thence the islands takes an easterly direction for 7 miles to Whale point, the south end of Whale cay.

Frazers Hog cay.*—About a mile eastward of Whale point there are some remarkable white sand cliffs 80 feet high. Frazers Hog cay lies close to the westward of the point, and under it there is good shelter with northerly winds, in 3 fathoms, and vessels of very light draught can get close in under Thompson cay.

Whale cay lies at the south-east extreme of the group, and forms an elbow to the north-east and north $4\frac{1}{2}$ miles long; at the north end there is a single house. The flat bank of soundings just mentioned, commences at the turn of the elbow. Between Whale and Bonds cays the opening is about $1\frac{1}{2}$ miles wide, and near the centre of it are two remarkable small rocks, called the Sisters, which are connected to the latter cay by a ledge nearly dry, forming a breakwater to a snug anchorage for small craft. The channel lies to the southward of the Sisters, and the eye will guide the vessel through in from 10 to 15 feet.

Bonds cay, the next northwards, is $3\frac{1}{2}$ miles long, and the cut between it and Frozen cay is about half a mile wide, but foul and impassable. The latter cay, the easternmost of the group, is only a mile long, and round its north end a vessel will carry 15 feet water into an anchorage on the west side, in three fathoms water, open, however, to the north-east.

Little harbour, Holmes, and Market Fish cays occupy a space of about 8 miles in a N.N.W. and S.S.E. direction, and are

* Frazers Hog cay is locally known as South Whale cay and sometimes as Bird Island, and Thompson cay as Frazers Hog.—Navigating Sub-Lieutenant C. H. Hopkins, 1874; also H.M.S. *Zephyr*, 1875, Lieut. Commander Hamilton.

only separated by small shallow cuts; in the centre of Holmes cay are some conspicuous white cliffs. The shore eastward of these cays is foul for nearly a mile. Between Market fish cay and Haines cay, which bears W.N.W. from it, there is an opening 3 miles wide, and an anchorage in it for small craft.

Haines cay is about 3 miles long, N. by W. and S. by E., and its north end terminates in a white sandy bluff. To the northward of the bluff there is a small rocky islet called the Hawk's nest, under which there is good boat shelter.

Great harbour cay, about 60 feet high, is nearly connected to Haines cay, and is the largest of the Berry islands. It is 6 miles long, a mile broad in the centre, and has a few settlers. Its eastern shore forms several sandy bays, separated by low white stone cliffs. Near the centre, about three-quarters of a mile off shore, is Petit cay, with a boat channel within it. Shallow rocky ground extends from the north-west end of this islet, to within about $1\frac{1}{2}$ miles of the north end of Great harbour cay, and a wide berth had better be given to it. The soundings are so regular, that at night they scarcely give warning of approach, and great care must be taken not to come within the depth of 10 fathoms.

Anderson, Bamboo, Cistern, and Lignum Vitæ cays lie on the west side of Great harbour cay, and are only separated by small boat channels. On Anderson and Cistern cays there are remarkable clumps of dark trees, 100 feet above the sea. Between the latter and Bamboo there is a small snug inlet, called Bullock harbour, for coasters drawing 8 feet. The channel is through Great harbour, between Goat and Lignum Vitæ cays, or from the westward round Little Stirrup cay.*

Great Stirrup cay, the northernmost of the Berry islands, is woody, $1\frac{3}{4}$ miles in length east and west, a quarter of a mile in breadth, and about 60 feet high. The north side presents a bold rocky shore, with 3 and 4 fathoms water close-to, except at the western end where it is not so steep, and the edge of the bank is about a mile distant. About half a mile from the west end, there is a small sandy cove, and some wells of good water, and landing is generally easy, except with northerly winds. In moderate weather, with the prevailing easterly winds, a vessel may anchor about three-quarters of a mile off shore in 7 fathoms, sandy bottom, with the flag-staff on the hill S. by E. A small supply of stock and vegetables may also be obtained.

LIGHT.—At 600 yards within the east end of Great Stirrup cay, is a circular tower, 46 feet high, painted with red and white bands alter-

* See Admiralty plan :—Great Stirrup cay, No. 1,432, scale, $m = 4\cdot7$ inches.

nately, and exhibits at 81 feet above high water a *fixed* white light visible 15 miles in all directions except over the land between the bearings of about N.W. by W. and (about) N.E.

Great harbour.—Great Stirrup cay is separated from Great harbour cay by an opening 4 cables wide, and within it there is a limited anchorage, with a depth of $3\frac{1}{2}$ fathoms, called Great harbour. This place, however, is completely exposed to the north-east, and, except in a handy fore-and-after, a vessel might meet with considerable detention. Those under 10 feet draught can get close up under Great harbour cay, or lie more snugly in Panton cove at the south-east end of Great Stirrup cay. Goat cay, which is about half a mile within the opening, forms a remarkable steep rounded woody hill, 80 feet high.

Directions.—Should a vessel be forced to run for Great harbour, bring the south end of Goat island to bear S.W. and just clear of the north end of Great harbour cay, which is bold and steep-to, to the distance of a cable. This mark will lead just clear of the east end of the bar which extends out from Stirrup cay; give the north end of Great harbour cay a berth of rather more than a cable, and anchor with it bearing East, in 3 fathoms water; or shoot a vessel farther in to the south-east of the point according to her draught.

Slaughter harbour is a small basin, between the Stirrup cays, scarcely 2 cables in diameter, but has a depth of 15 to 18 feet. The channel, however, is barred, and only navigable at high water with the assistance of a pilot, for vessels drawing 12 feet. It is quite open to the northward, but the bar, which generally breaks across with this wind, protects the anchorage.

Little Stirrup cay, the last of the range, is about a mile in length, 55 feet high, and steep-to; there are 5 fathoms on the north side close to the rocks. A shallow sand spit runs off a little more than a mile from the west end, with a channel between for small craft, leading round to Slaughter harbour.

Tides.—It is high water, full and change, at Great Stirrup cay, at 7h. 0m.; the rise at springs is 4 feet, and the tidal streams run directly in and out of all the above openings with great rapidity.

Directions.—From a position 3 miles South of Abaco lighthouse, the course to Great Stirrup cay lighthouse is West 39 miles, and from the latter to Gorda cay, at the entrance of the North-west Providence channel, is 22 miles, N.E. $\frac{1}{4}$ E. By paying proper attention to the lead, no accident can well happen in approaching these islands from the north and east.

Mackie bank.—A chequered *black* and *white* buoy with staff and two chequered balls, in 2 fathoms at low water, lies on the south-east edge of the bank, in lat. $25^{\circ} 28' N.$, long. $78^{\circ} 45\frac{1}{2}' W.$ This buoy is intended to guide vessels in crossing the Bahama bank, and to correct their positions in running from Stirrup cay to Orange cay; it is visible 5 or 6 miles.

N.W. end of Great Bahama bank.—From abreast the Stirrup cays the northern edge of the bank takes a westerly direction, with a slight bend to the southward for about 35 miles, to the east end of the Gingerbread ground. In this space it is quite free of danger, and the lead will be a safe guide. Thence it trends N.W. by W. about 35 miles farther, when it gradually rounds Great Isaac, at the distance of about 6 miles.

The Gingerbread ground is about the most extensive and most fatal danger on the Great Bahama bank, the current setting strongly over it. The foul ground, full of rocky heads, lies close to the edge of deep soundings, on dark bottom, not easily seen from a distance, and may be said to extend from the above position given for its east end, to the Great Isaac, a distance of 30 miles, and it is from 2 to 5 miles in breadth. There are several small low rocks on it, and several cuts through, which are clearly pointed out in the chart, but strangers had better not attempt them, unless forced to do so, and then they must entirely depend upon the eye.

The Little Isaacs, the easternmost of these rocks, are three in number. The easternmost, called East Isaac, is 11 feet high, and lies E. by S. 14 miles from Great Isaac, 18 miles from the east end of the Gingerbread, and about 3 from the edge of the bank; at $1\frac{1}{2}$ miles to the eastward of it there is a small rock awash at high water. Middle Isaac is only half a mile westward of the east rock, and 12 feet high; and Little Isaac, 2 miles farther in the same direction, is 8 feet high, and $3\frac{1}{2}$ miles within the edge of the bank.

The Brothers are two very similar small black rocks 7 and 6 feet high. East Brother lies N.W. by W. $\frac{1}{2}$ W. 7 miles from Little Isaac, and West Brother is a little more than a mile farther to the W.S.W.

N.E. or Gull rock, equally small, and 12 feet high, lies W. by N. nearly $3\frac{1}{2}$ miles from West Brother, and N.E. by E. $1\frac{1}{2}$ miles from Great Isaac.*

* Some rocks with not more than 12 feet water on them are said, by the Bahama pilots, to lie about $1\frac{1}{2}$ miles to the northward of N.E. or Gull rock, in line with the east end of Great Isaac; 1844.

Great Isaac, at the north-west extreme of the Great Bahama bank, is a barren, narrow, honeycombed rock, about three-quarters of a mile long, and about 40 feet high, and being foul, yet very steep-to, landing is sometimes difficult even in moderate weather. There are $4\frac{1}{2}$ fathoms water between it and N.E. rock, and the same depth between it and the Brothers, but, as before recommended, it will be better to pass outside all. The ground to the south-west of Great Isaac is foul for half a mile.

LIGHT.—On Great Isaac rock is a circular iron tower, 145 feet high, painted with broad red and white bands, which exhibits 158 feet above the sea a *revolving* white light, attaining its greatest brilliancy every *half minute*, and seen in clear weather 16 miles; within the distance of 6 miles a *fixed* light is visible between the flashes.

Hen and Chickens form a group of barren rocky islets, lying S.W. 3 miles from Great Isaac, and occupying a space of about a mile. The north-east rock, the largest, is 14 feet high; the others are only a few feet above water. A vessel may round their north end at a quarter of a mile, to anchorage on the bank in 4 fathoms; but the ground to the south-west is foul to the distance of three-quarters of a mile, where the depth is $2\frac{1}{2}$ fathoms.

The West side of Great Bahama bank, after rounding Great Isaac at the distance of from 5 to 6 miles, takes a S.S.W. direction, and comes within about 5 miles of the Hen and Chickens; in passing this neighbourhood in the night, do not come within the depth of 10 fathoms.

Moselle bank.—This dangerous coral ledge, with only 4 feet water on its south end, lies N.W. by N. $1\frac{1}{4}$ miles from North rock, and S.W. $\frac{1}{2}$ S. 16 miles from Great Isaac. It is about a mile in length north and south, but very narrow, and lies about a mile within the edge of the bank, with 6 to 5 fathoms close to.

Buoy.—A *black* buoy with staff and ball lies on the north end of Moselle bank, in 4 fathoms water, with North rock on with the north-east point of North Bemini bearing S. by E. $\frac{3}{4}$ E., in lat. $25^{\circ} 90' N.$, long. $72^{\circ} 17' 30'' W.$

North and South Bemini are two irregularly shaped, sandy islands, covered with small wood to the height of about 40 feet, and occupy a space of nearly 6 miles north and south. They are separated by a very narrow cut, which opens out to the eastward, and forms a secure harbour for wreckers drawing 8 feet. There is here a small settlement, and a resident magistrate; and vessels in distress may obtain water and supplies sufficient for the moment.

At the south end of the island the edge of the bank is only three-quarters of a mile from the shore, but at the north end it is nearly 3 miles distant; anchorage will be found in 8 or 9 fathoms water fine sand, about mid-way between the extremes, and a mile off shore; care must be taken not to shoot too far in, and to look out for a clear spot. A little more than a mile northward of the north end of the islands there is a remarkable small black rock, 8 feet high, called North rock. A shoal patch, with about 3 feet water on it, and known as the Henry bank, is stated to lie about W.N.W., half a mile from the south point of South Bemini, and a quarter of a mile off shore; as the depths are irregular, this part of the bank should be approached with caution.

Picquet rocks.—A spar surmounted by a barrel has been placed as a beacon on the northernmost point of Picquet rocks, $3\frac{3}{4}$ miles northward of Gun cay lighthouse, for guiding vessels to Barnett harbour.

NOTE.—Vessels of not above 14 feet draught can find shelter from southerly and westerly winds by standing in on the Great Bahama bank, on an East course, midway between the rock awash northward of Picquet rocks beacon, and Triangle rocks—anchoring in 3 fathoms over clear sand, with Gun cay lighthouse bearing S. $\frac{3}{4}$ E.

Gun cay.—Between the south end of the Bemini islands and Gun cay, which lies South $6\frac{1}{2}$ miles from them, there is a range of small rocks from 10 to 18 feet high, within three-quarters of a mile of the edge of the bank. The tide sets through the openings with great velocity, and the Florida stream comes close home to soundings.* Gun cay is a mile in length N.N.W. and S.S.E., but very narrow.

LIGHT.—On the south end of Gun cay stands a conical tower (upper part red, lower white), from which is shown a *red* light which *revolves every minute and a half* 80 feet above the sea, and visible 12 miles, except when it bears between S. $\frac{3}{4}$ E. and S. by W. $\frac{1}{4}$ W., being then intercepted by the Bemini islands, when nearer than 8 miles. When within 5 miles to the northward of the light, it should not be brought to the southward of S.E., in order to avoid the low rocks between it and the Bemini islands, which sweep slightly outwards, and being so close to the edge of the bank the lead will be of little use. There is temporary anchorage with easterly winds in 7 or 8 fathoms water, about three-quarters of a mile off shore, with the lighthouse bearing East. Wreckers find good shelter within the cay, by passing round the south end.

Cat cays are two narrow woody islets 40 feet high, lying from one to 2 miles within the edge of the bank, and extending about 4 miles

* See Admiralty chart:—West Indies, sheet 1, Florida strait, No. 1,217, scale $m=0.06$ of an inch.

S.E. by S. of Gun cay, from which they are only separated by the small channel mentioned above. Round the south point of the southern cay there is a good anchorage, called Dollar harbour, for vessels drawing under 12 feet, where they will lie sheltered from all quarters but the south. The point is bold and steep-to, and the only danger to be avoided is Rabbit rock, which is nearly awash, and lies W.N.W. a mile from the point. Gun cay lighthouse open west of Round rocks clears the Rabbit. There are some small barren rocks about 14 feet high at three-quarters of a mile S.W. of the point, and they must be left to the southward in going in. The small rocks called Victory cays, 12 feet high, extend nearly $2\frac{1}{4}$ miles to the south-east.

Water.—Some wells of good water will be found on the east side of North Cat cay, about a quarter of a mile from its southern end.

Browns cay is a barren rock, 13 feet high, lying S.S.E. $\frac{1}{2}$ E. 12 miles from Gun cay lighthouse, and $1\frac{1}{2}$ miles nearly north of it there is a small sandy cay of the same height. Off the south end of Browns cay is a small black rock, and between it and the cay there is a 9-foot channel to the bank.

Beak cay, $1\frac{1}{2}$ miles farther southward, is partially clothed with stunted bushes about 13 feet high. Thence to Riding rock, 7 miles distant, the space is filled with small rocks and coral ledges, and quite impassable.

Riding rock is 14 feet high and scantily covered with brushwood. At $1\frac{1}{2}$ miles southward of it is South Riding rock, 13 feet high, which has on it a small rough beacon of stones. At half a mile eastward of South Riding rock is a small square islet 12 feet high, called Castle rock, south-east of which is an anchorage for small vessels.

Orange cay, bearing S. $\frac{1}{2}$ E. about 17 miles from Riding rocks, is the southernmost islet on this side of the Great Bahama bank. The ground between it and Riding rocks is foul and almost choked up with a line of small rocky heads. In some places there are 3 and 4 fathoms water between them, but except in a case of necessity it would not be prudent to pass through. Orange cay is a barren rock about 13 feet high, lying about 2 miles within the edge of soundings. A ridge of low rocks runs off $1\frac{1}{2}$ miles to the northward of it; and at the same distance southward there is a single small black rock, from which a coral ledge, with only 12 feet water on it, extends off 2 miles in the same direction. There is temporary anchorage westward of the cay in about 6 fathoms water.

The S.W. side of Great Bahama bank, trends South from Orange cays, and for 20 miles, to the parallel of $24^{\circ} 35'$ there are few very shallow patches, although there are depths of 3 and 4 fathoms,

1½ miles within the edge. Thence the bank inclines gradually to the eastward of South, and becomes foul, but all the dangers are clearly pointed out on the Admiralty chart, which will be a safe guide.

Directions for crossing Great Bahama bank.—

The greater number of vessels proceeding from the ports of northern Europe, and almost all from North America, bound to Matanzas, Havana, and the ports in the southern states of America in the gulf of Mexico, run through the North-west Providence channel. Those drawing under 12 feet may cross the bank between Berry islands and the western cays, but those of heavier draught must pass outside all. Being 5 or 6 miles South of the Abaco lighthouse, the course will be about W. ½ N. 40 miles to the edge of soundings off Great Stirrup cay.

Having brought the lighthouse on Stirrup cay to bear E.S.E. distant about 4 miles, steer S.W. by W., and from the edge of soundings run 33 miles, to the commencement of the flats or Middle ground, which extends right across the bank, and is about 15 miles in breadth. Thence a S.W. by S. course, 46 miles should lead 5 or 6 miles eastward and in sight of Orange cay, and to the edge of the bank about 13 or 14 miles southward of it. A vessel may verify her position by sighting the beacon buoy on the south edge of Mackie bank.

In crossing the flats the eye must guide the vessel between the numerous clear white sand ridges and small black heads, which are easily seen even in the night-time, if the weather is clear. Some attention, however, should be paid to the tide on the first course. Should the vessel enter upon the bank with the first of the flood, and a commanding breeze, she had better steer half a point farther to the westward, and the contrary on the ebb, judging at the same tide according to the depth, which should gradually decrease up to the sand ridges.

The course from the edge of the bank about 14 miles south of Orange cay, to the edge of cay Sal bank, northward of Dog rocks, is S.W., 50 miles.

Tides.—It is high water, full and change, on the bank, at 8h. 0m., and the stream runs from one to half a knot an hour, to within a short distance of the north side of the Middle ground. On the flats there is very little set, and on the south side of the Middle ground the stream goes regularly round the compass from East to South and West, from high to low water and the contrary. On the parallel of 25° N., about 16 miles eastward of Orange cay, it is not high water, full and change, before 10h. 15m., and the rise is 3 feet, so that a vessel will carry two hours more of high water across the shallowest part of the bank; therefore by entering upon the S.W. by S. course at three-quarters flood a steamer of 13 feet draught may cross the flats before the tide begins to fall.

Caution.—Although the water is so shoal and clear, the lead should be well attended, and the line marked to feet (when wet), as the vessel may be set by the tide too far to windward on the Long banks, or on the Elbow bank to leeward, which will be indicated by the gradual decrease of depth, as she approaches either way, should the wind be scant. If she gets to the eastward of the track, towards what is called the Long bank, the little heads of sponge and dark fans will become more numerous. In the winter months, should the wind haul to the southward, a sure indication of a north-wester, instead of beating about amongst the shoals it will be better to anchor and await the change that will soon follow.

OUTER PASSAGE.—Vessels drawing over 12 feet, as noticed above, must pass through the North-west Providence channel, and close along the western edge of the Great Bahama Bank, and in the winter months, more particularly, the navigation requires the utmost care and attention. There is generally but little current in the channel, except after northerly winds, when it frequently sets eastward about a knot an hour. Having rounded the Abaco light as before directed, a W. by N. course for 90 miles should lead to a position nearly E.N.E., about 18 miles from, and, if the weather is clear, in sight of Great Isaac lighthouse, and 6 or 7 miles from the edge of the bank.

If it be found that the Isaac lighthouse will be made during daylight, the course may be altered to West for that purpose, after running about 80 miles, but not before, in order to keep well clear of the Gingerbread ground, and the greatest caution and attention to sounding should be observed on approaching this most dangerous neighbourhood. Having rounded Great Isaac, shape a course along the cays, taking care in the night not to come within the depth of 10 fathoms, or to bring the light to the northward of N.E. $\frac{1}{2}$ N. until Moselle bank is passed, or, *from aloft*, Gun cay light is opened westward of Bemini islands.

After passing North Bemini, the cays must be closely hugged, in order to avoid the Florida Stream, which, as stated before, comes close home to the rocks with its full strength. A short calm, within a mile of the edge of this part of the bank, might drift a vessel so far to the northward as to oblige her to run out around the little Bahama bank, and to enter again from the eastward. Therefore, instead of attempting to beat along with a light wind, it will be more prudent to anchor under North Bemini and await a slant to get round the elbow.—*Directions continued at page 542.*

Should a vessel be caught here in the winter, with the usual warning of a north-wester, it will be better to run back into the North-west Providence channel, and be guided by bearings of Great Isaac until the wind draws round to the northward, which it is sure to do generally in

the course of 24 or 48 hours. She may also run in between the openings to the northward of Moselle bank, and anchor on the bank in $4\frac{1}{2}$ fathoms, 2 or 3 miles within the Hen and Chickens; but she will be exposed to a short chopping sea, and might find some difficulty in weighing, and run the risk of losing her anchor.

It is advisable for sailing vessels not to attempt to cross over to cay Sal bank until having reached Orange cays, as before indicated. In the summer months, when light south-east winds prevail, a strong N.W. current frequently runs into the Florida stream from Santaren channel, and vessels meeting with a calm or light airs at this period are frequently drifted through the strait, even in sight of the Bahama cays.

The North-west Providence channel is seldom navigated from west to east, except by vessels of war bound to Nassau. In this case, after sighting the Elbow lighthouse on cay Sal bank, which should always be done if possible, endeavour to make Gun cay light well to the southward, closing in to the cays as quickly as possible, getting on the edge of soundings at the Bemini islands, and haul sharp round Great Isaac. Be extremely cautious, however, to avoid Moselle bank (page 534). A vessel will generally have to beat up from Great Isaac, and, as already stated, too much caution cannot be observed in standing towards the Gingerbread ground. Should the wind hang to the southward of East, it will be equally necessary to guard against getting embayed in the bight between Gorda cay and the south point of Great Bahama island, for with south-east winds there is frequently here a strong indraught, and no safe anchorage.

CAY SAL BANK.*

This bank, somewhat in the shape of a pear, with the thin end to the south-east, is skirted by islets on all sides but the south. It is 60 miles in length south-east and north-west, and about 40 miles across at the broadest part, from cay Sal to the north-east edge.

LIGHT.—On the highest of the Double-headed Shot cays, named North elbow, at the north-west edge of the bank, stands a conical lighthouse 58 feet high, (white and red upper part,) which exhibits a *fixed* white light 96 feet above the sea, visible 15 miles, except when it bears S.W. $\frac{1}{4}$ W., being then intercepted by Water cay when 9 miles distant.

Anguila, the largest of the islets on cay Sal bank, is about 8 miles in length N.W. and S.E., three-quarters of a mile in breadth, partially

* See Admiralty charts :—No. 761, West Indies, sheet I., No. 1217, Florida Strait; No. 392, Gulf of Mexico; No. 659, Florida Strait; and No. 2579, Cuba, Western portion; scale, $m = 0.12$ inch.

wooded, and from 40 to 50 feet high. It is cut through in several places, but there is no opening fit even for a boat; it may, therefore, be described as one island. It lies at the south-east extreme of the bank, and its north-east side is close to the edge of soundings. Good anchorage will be found in 6 or 7 fathoms water, off the south-west side, with the south end of the islet bearing E. by S., and the north extreme N.N.W. $\frac{1}{2}$ W.

This uninhabited islet, situated near the south-east extreme of cay Sal bank, was examined by H.M.S. *Blanche* in 1880.

The landing on the western side of the islet was good, but there was a heavy surf on the eastern side.

No outlying rocks were observed beyond a distance of $1\frac{1}{2}$ cables from the shore.

Anguila islet is everywhere sandy and covered with shells, being overgrown with thick brushwood and with many stunted palm trees upon it; there is a swamp near the south extreme, but no springs of fresh water were discovered.

The shore is formed by beaches of fine sand and limestone rocks.

From Anguila, the north-east side of the bank trends nearly straight N.W. by N. about 40 miles, and forms the west side of the Santaren channel, which at the south-east end is 28 miles wide, and 38 miles at the north-west, but it is quite out of the track of general navigation. Between Anguila and the Dog rocks to the north-west are several clusters of small low rocks, with deep water between, but most of the openings are dangerous.

Dog rocks, the north-easternmost islets, are about 30 feet high, barren and rocky, and bending round to the north-west occupy a narrow space about 5 miles in length. They are separated near the centre by a narrow but deep navigable cut, and the eastern edge of the bank is about 2 miles outside them. The north-east point of the bank lies 5 miles N.N.W. of these islets, therefore vessels crossing over from the Great Bahama bank in the night, by proper attention to the lead will escape danger; and it may be observed that accidents frequently happen here by neglecting this safeguard. The opening between these islets and the nearest rocks to the south-east is 7 miles wide, and although the soundings are irregular and the bottom dark and alarming, it appears to be quite clear, and is frequently used by vessels crossing inside the cays.

Muertos or Deadmens cays lie W. $\frac{1}{2}$ S. 9 miles from Dog rocks, and this opening is also quite free of danger, and may be safely used if necessary. The Muertos are a range of small detached rocks,

from 10 to 15 feet high, extending 15 miles in a W.S.W. direction to the east end of Water cay. They lie about 3 miles within the edge of the bank, but great care must be taken in the night, as they are steep-to, and the soundings do not indicate the distance from them, they are likewise not in sight of the Elbow cay light. Several of the rocks are a considerable distance apart, but it would not be prudent to cross the ledges between them.

Water cay, the easternmost and largest of the Double-headed Shot cays, is about 2 miles long and about half a mile broad. Near the centre of the south side, there is a natural well of excellent water, and abreast it, on the same side of the island, a good landing-place.

Marion rock.—This rocky ledge, having a least depth of 6 feet upon the eastern extreme, (from which the west extreme of Water cay bears S. by W. distant half a mile,) extends about $2\frac{1}{2}$ cables in a W.S.W. and E.N.E. direction, and has a general depth of from 3 to 7 fathoms with three rocky heads upon it, over which there are 6, 7, and 8 feet respectively.

Double-headed Shot cays are from 20 to 40 feet high, and lie so close to each other that there is scarcely a safe boat channel between, and consequently form a complete breakwater to a good anchorage within them. From Water cay they trend S.W. by W. $\frac{1}{2}$ W. 8 miles, where they form an elbow, and thence sweep round S.S.W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles. The edge of the bank is about $3\frac{1}{2}$ miles from Water cay; thence it gradually approaches the islets. The South Elbow cay lies almost on its edge, and the Florida stream generally runs with its full strength close alongside it.

From Double-headed Shot cays the south-west side of the bank trends to the southward and eastward for 12 miles to cay Sal, the only islet on this part of the bank. From the southernmost of Double-headed Shot cays foul ground extends off $1\frac{1}{2}$ miles to the S.S.W. The Rompidas, $4\frac{1}{2}$ miles from the north-west end of cay Sal, is a rocky ledge awash, $1\frac{1}{4}$ miles in extent north-west and south-east close to the edge of soundings. The opening on either side of the ledge is quite free of danger, but in running on or off the bank it will be better to pass to the northward of it.

Cay Sal, so named from its possessing a valuable salt pond, is in the shape of a triangle, each side being about $1\frac{1}{2}$ miles in length. The north-east side is formed by a narrow ridge of sand-hills about 30 feet high; the other parts are very low and sandy, and partially clothed with brushwood. During the season for raking the salt it is inhabited. There is temporary anchorage close under the west side, in about 7 fathoms on the edge of soundings, but it is not good. The tides set round it with great strength, and are sometimes influenced by the Florida stream running to the south-east. Captain Kennedy, who visited this cay in H.M.S. *Druid* in 1881, observes

that the salt pond is connected with the sea by a gut, through which the tide ebbs and flows. It probably dries in the summer, leaving a bed of salt, which is collected by persons visiting the island. The anchorage on the west side is good, a clear sandy bottom sloping gradually to the beach. Two old wrecks were seen on the weather side. It would be a great boon to passing vessels, as also to shipwrecked mariners, if cocoa-nut trees were planted. The cay is covered with stunted palm trees of no use but for thatching of huts. There is an abundance of a weed having a pod resembling French beans, pleasant to the taste, and fit for rabbits, hogs or goats, also wild guava trees bearing fruit. The lagoon abounds with fish and turtle, and the beach with shells, sponges, and marine curiosities.

The Lavanderas is a small rocky ledge, awash, lying 2 miles eastward of cay Sal. Between this and the Anguila islets there does not appear to be any danger along the southern limits of the bank; this part, however, has not been satisfactorily examined, and it is stated that many rocky heads may be found near the edge.* The centre of the bank is foul in many places, and vessels beating over it had better keep within 7 or 8 miles, and in sight of the northern cays.

Directions continued.†—Vessels proceeding westward from the Great Bahama bank should endeavour to strike soundings on the north-east end of cay Sal bank. Should the wind be scant from the westward, they may run in on bank on either side of Dog rocks, and pass off to the southward of the Elbow; or should the wind be light and tending to calm they may anchor within, to avoid being set to the northward; otherwise it will be better to run down outside, especially in the night, paying great attention to the lead.

Having passed Elbow cay light, the course should be S.W. $\frac{1}{2}$ W. until close over to the Cuba shore, to avoid the strength of the current. This course should lead direct towards the peak of Matanzas, and within about 12 miles north-west of the *fixed* light (varied by a *red* flash every *two* minutes) on cay Piedras, but this will depend upon the set of the current, which is very uncertain, and sometimes strong into the Nicolas channel.

* "At daylight weighed from the anchorage at cay Sal, and proceeded eastward at about 2 miles within the southern edge of the cay Sal bank, in from 4 to 7 fathoms, water smooth as glass, and so clear that the bottom was distinctly visible, as if only a slight green gauze intervened between the eye and the numerous objects on the rocks and sand below; whilst sharks, dolphin, star, king fish, turtle, and every description of animate and inanimate nature was passed in a perfect panorama beneath; in no part of the world have I seen water of this depth so perfectly transparent. At 3h. 50m. p.m. came to in 4 fathoms water, with the north extreme of Anguila bearing N.W. by N., and the south extreme E. by S."—W. C. Bicknell, Master, H.M.S. *Barracouta*, 3rd March 1863.

† From page 539.

If bound to the south-western ports of the southern states of America, it will be advisable to run along the Cuba shore as far westward as Mariel, and thence shape a N.W. course, so as to pass at a proper distance westward of the Tortugas. Should the Cuba shore be left in the day-time, an occasional bearing of the high land will enable the mariner to estimate the strength of the stream, and to regulate his course accordingly. He may depend upon finding the current right across, and probably with increased strength as he advances to the northward.

Some navigators recommend vessels to cross over at once from Orange cay, on the Great Bahama bank, to the Florida shore, and having struck soundings, to run along the edge of the reef, keeping off the bank during the night. This route might shorten the voyage considerably, but it is attended with great risk and uncertainty. A steamer might accomplish it in safety; but by no means attempt to strike soundings in the night, and be very cautious indeed in doing it in the day, especially if the latitude be at all doubtful. For Florida cays, *see* Chapter XI.

LITTLE BAHAMA BANK.*

This bank lies to the northward of the Great Bahama Bank, from which it is separated by the Providence N.E. and N.W. channels. It is about 140 miles in length, and varies in breadth from about 30 to 50 miles.

GREAT ABACO ISLAND.†

This, the largest of the numerous islands which skirt the Little Bahama bank on all sides but the north-west and west, rises on the eastern side of the bank, and is inhabited. It is nearly 70 miles in length, and in shape very irregular. At its northern end it is separated, by a shallow creek, from Little Abaco island, a narrow cay extending 20 miles farther to the westward. The south-east extreme is 2 miles in breadth and 90 feet high; at the eastern end of this headland there is a small narrow tongue of low flat rock, which projects about $1\frac{1}{2}$ cables to the southward, and close off it a very small rock. This remarkable point is called the Hole in the wall, from the sea having pierced a large arch through the rock, which is visible about three miles off, from S.S.W. to W.S.W., and the opposite bearings. A narrow spit runs out south-east 5 miles from this point, with a depth of from 9 to 15 fathoms; from its south-east extreme the lighthouse bears N.W. $\frac{1}{2}$ W.

* Amended by Lieutenant W. S. White, from surveys made in H.M.S. *Sparrowhawk*, to 1885.

† *See* Admiralty chart No. 399, West Indies, Bahama and Abaco island, &c.; scale, $m = 0.25$ inch.

LIGHT.—About 4 cables northward of the Hole in the wall is a conical stone tower, 85 feet high, with the lower part painted white and the upper red. It exhibits a *white* light which *revolves* every *minute*; the light is 160 feet above the sea, and in clear weather may be seen 20 miles.

Anchorage in 10 fathoms will be found on the west side of the south point of Abaco, three-quarters of a mile from the shore, with the lighthouse bearing E. by N. $\frac{3}{4}$ N. but the bottom is foul.

Cherokee sound.—From the Hole in the wall the eastern shore of the island trends northward 16 miles to Crossing Rocks, where there is shelter for boats in an emergency, then turns gradually to the eastward forming a large bight called Cherokee Sound, which is everywhere foul except under Cherokee point at the N.E. corner, where, with local knowledge there is shelter for small coasters.

Settlement.—The village of Cherokee lies one mile to the northward of Cherokee point. No supplies.

From Cherokee point to Little Harbour point the coast again trends to the northward, rising to a height of 120 feet. This part of the coast may be recognized by Ocean point, a bold cliffy point 30 feet high at the north end of Winding bay; there is no other part of the coast like it.

Caution.—There are several rocky ledges, on which the sea breaks heavily off this part of the coast, which are not yet thoroughly examined.

From Little Harbour point to the northward the Abaco islands are skirted, at a distance of from 2 to 6 miles, by a line of numerous cays between which are narrow channels leading into the large sheet of water, navigable by small craft, within them.

Little harbour.— $1\frac{1}{2}$ cables north of Little Harbour point, a small channel having a depth of 11 feet, leads into Little Harbour, but it is difficult to make out, even with local knowledge.

Lynyrd's cay $2\frac{1}{2}$ miles long lies one mile north of the point; on its eastern side a broken reef extends about $\frac{1}{2}$ mile seawards, while at its northern end a spit runs off nearly dry for one cable. Soundings extend 3 miles to the eastward of the Pelican cays.

Pelican harbour.—2 cables from the north end of Lynyrd's cay, the N. Bar channel, having a depth of 16 feet half-way between Channel rock and the point, leads into Pelican harbour, where there is good shelter under the lee of the Pelican cays, but it requires local knowledge to make sure of crossing the bar in that depth.

Tides.—It is high water, full and change, in Pelican harbour at 8h. 0m. Springs rise 4 feet.

NOTE.—On the bar the tides run N.W. and S.E. $2\frac{1}{2}$ knots at springs.

Settlement.—There is a small settlement known as “The Village” on the east side of the peninsula separating Pelican harbour from Little harbour, where water can be obtained.

Elbow cay is separated from Tilloo cay by a narrow channel, at its north end is a high sandy bluff, about a mile to the southward of which is the settlement of Great harbour. A thin fringing reef runs along the outer side of these cays and abreast the settlement is about $\frac{3}{4}$ of a mile off, at the northern end the reef extends one mile from the shore and then turns to the north-westward. A spit runs out to the eastward of the Elbow for 4 miles having a depth of from 9 to 15 fathoms.

LIGHT.—On Elbow cay is a circular stone tower, 77 feet high, with red and white bands, which exhibits at 123 feet above the sea a *fixed* white light, visible in clear weather 15 miles.

Caution.—The current outside these reefs generally runs to the north-west, but sometimes in an opposite direction, its rate varies very much, but in the winter months is occasionally as much as from 2 to 3 knots per hour. It is therefore advisable, as already stated in page 524, for a vessel to strike the parallel of $26^{\circ} 30' N.$ well to the eastward of the cay. Should the wind be to the southward when in this neighbourhood, and the light not in sight, or the reckoning doubtful, it will be prudent to keep the vessel's head to the eastward in the night, as the lead will not give sufficient warning of the danger.

Man-of-War cay.—From Elbow cay the range of small islets takes a N.W. by W. direction for 90 miles, and skirts the shore of Abaco at the distance of from 2 to 6 miles. $2\frac{1}{2}$ miles to the north-west of Elbow cay is Man of War cay, which is $2\frac{1}{2}$ miles long; between them are some small low rocks called the Drunken cays. The Elbow reef follows the line of the cays at a distance of about a mile as far as Man-of-War channel, through which 14 feet may be carried. To enter this channel steer S. $\frac{1}{2}$ W. for the N.W. end of Man of War cay until midway between the points of reef, then S.S.W. $\frac{1}{2}$ W. for the entrance, when the eye must be the guide; the deepest water is to the eastward of a dry rock and between it and a sunken rock lying $1\frac{1}{2}$ cables from the point of Man-of-War cay, which always breaks. In a case of danger, a vessel of the above draught may save herself by running in here and anchoring under the lee of the cay, but without local knowledge it would be attended with risk.

Tides.—It is high water, full and change, at Man-of-War cay at 8h. 0m., and the rise $4\frac{1}{2}$ feet.

Cotland and Great Guana cays, separated from one another by a narrow boat channel, extend to a distance of 9 miles from Man-of-War

channel, fringed on their seaward sides by a broken reef to a distance of $\frac{3}{4}$ of a mile.

The northern end of Great Guana cay terminates in a bold bluff 70 feet high, which is conspicuous from the eastward; from it foul ground extends W.N.W. $2\frac{1}{4}$ miles.

Chub rocks.— $3\frac{1}{2}$ miles N.W. by W. $\frac{1}{2}$ W. from the bluff is a small patch of rocks 4 feet high, which may be passed on any side at a distance of 3 cables. These rocks are a good guide to the Whale cay channel, 2 miles to the south-west of them.

Whale Cay channel.*—Vessels intending to visit the settlement on Green Turtle cay, the principal village on the Little Bahama bank, must use the Whale cay channel, through which a depth of 14 feet may be carried. It lies between Whale cay and the rocks to the north-west of it. The deepest water on the bar is 3 cables from the end of Whale cay, between the point and a sunken rock, which generally breaks, and lies S.E. by E. $\frac{1}{4}$ E. half a mile from Channel rock. From this position the highest part of the Chub rocks bears N. $61\frac{1}{2}^{\circ}$ E. After crossing the bar a course of W. by S. $\frac{1}{2}$ S. leads in for $2\frac{1}{2}$ miles till Dont rock is open to the southward of the Sand bank cays, S.E. by E. $\frac{3}{4}$ E., then alter course to the north-west, and anchor as convenient.

Supplies.—At Green Turtle cay wood and water may be obtained, provisions are scarce.

Tides.—It is high water, full and change, at Green Turtle cay at 8h. Om. Springs rise $4\frac{1}{2}$ feet.

From Green Turtle cay to Walker's cay the line of cays is fringed by a broken reef extending, as far as Pensacola cay, to a distance of $1\frac{1}{2}$ miles from the shore; to the westward of that it is much farther from the cays, generally about 3 miles. Vessels are therefore cautioned not to approach this part of the bank as it is often difficult to discern the cays from the edge of soundings.

There are several channels between the cays, but they are very intricate and foul; no directions can be given for them, the eye must be the guide.

Inner channel.—Between the cays and Abaco there is a passage for vessels of 12 feet draught. Entering at Whale cay channel it is 4 to 5 cables from the shore of Great Abaco island, passing north of Little Sale cay and the Double Breasted bars, southward of the triangle rocks, into the open water on the western portion of the bank.

NOTE.—In navigating these banks a stranger is very likely to be deceived by what is known locally as "Fish muds," having all the appearance of shallow sand banks of considerable extent.

* See Admiralty plan No. 398, West Indies, Little Bahama banks, Whale cay channel, &c.; scale, $m = 2.0$ inches.

Matanilla reefs.—From Walker cay the Matanilla reefs, on which the sea breaks in moderate weather, run in a W. by N. direction 28 miles, and being steep-to are extremely dangerous. The west end of the reefs terminates on the meridian of about $78^{\circ} 50' W.$, in lat. $27^{\circ} 23' N.$, and from this point the edge of the bank trends W. by N. 16 miles to its north-west end. At $7\frac{1}{2}$ miles westward of the breakers there is a coral knoll 2 miles long north and south, called Middle shoal. At its north end there are $4\frac{1}{2}$ fathoms water a mile within the edge of the bank, and on the south side only 2 fathoms. The ground between it and the reef is also foul.*

Matanilla shoal.—This dangerous coral patch lies 4 miles westward of Middle shoal, 2 miles within the northern edge of the bank, and $3\frac{1}{2}$ miles from the north-west extreme, and at 5 miles W.S.W. of it the bank will be struck in 13 fathoms. The patch is not half a mile in extent, and on one small spot there are only 12 feet. All this part of the bank is extremely dangerous. The bottom being rocky and covered with dark weed, the water is not discoloured, and the shoals do not break; and the rock is so flat that no dependence can be placed on anchors.

Tides.—The tidal streams run on and off the Little Bahama bank, and near the edge are at times strong. The current in the offing is very uncertain for some distance to the northward.

West side of Little Bahama bank.—From the north-west extreme, the bank takes a S.S.W. direction about 15 miles, when it reaches its outer western limit in lat. $27^{\circ} 10' N.$ and long. $79^{\circ} 13' W.$ About $3\frac{1}{2}$ miles northward of this point is the south-west end of a narrow sand ridge 4 miles long, with from 10 feet to $3\frac{1}{2}$ fathoms on it, which comes within half a mile of the edge, and may be seen some distance from aloft. Thence the edge of the bank sweeps round to the south and S.S.E. 30 miles to the west end of Bahama island.

The whole of this part is closely skirted by narrow shallow sand ridges and detached coral patches, and is extremely dangerous. The Florida stream strikes the edge of the bank sideways, with a strength of from 2 to 3 knots, and the lead gives scarcely any warning. There are small openings here and there with 3 and 4 fathoms water in them, and in a case of absolute danger a vessel might be guided by the eye into safety on the bank, but it would be a mere matter of chance if she escaped shipwreck.

Memory rock.—This little dark, barren, rugged rock, only 14 feet high, lies N.N.W. $16\frac{1}{2}$ miles from the west end of Bahama island, about midway between it and the western limit of the bank, and three-quarters

* These reefs and the west side of Little Bahama bank are described from the surveys of Capt. E. Barnett, R.N., 1842.

of a mile within its edge. At three miles N.W. of it there is a most dangerous small coral patch, on which the sea generally breaks. Between the rock and patch there are from 3 to 4 fathoms water, about a mile within the edge of soundings, under the lee of a sand ridge, on which there are 2 fathoms. To the southward of the rock there is no safe opening for vessels drawing over 12 feet. The edge of the Florida stream comes generally close home to the rock. Between it and Bahama island vessels are only influenced by the tides, which set regularly on and off the bank at the rate of from a half to a knot an hour.

Tides.—At Memory rock it is high water, full and change, at 7h. 50m., but at Walker cay it is not high water before 8h. 50m. Springs rise about 3 feet.

Sandy cay is very small and covered with bushes to the height of 14 feet above the sea. It lies N. by W. 7 miles from the west end of Great Bahama, and 3 miles within the edge of soundings. A narrow sand spit, awash, runs off nearly 3 miles to the W.N.W.; and to the W.S.W. of it, on the edge of the bank, there is a very dangerous coral ledge which shows at low water.

Wood cay, about $3\frac{1}{2}$ miles South of Sandy cay, is a rocky islet, woody, half a mile long, and 26 feet high. Clear soundings extend out from it about half a mile, and there are $5\frac{1}{2}$ fathoms close under the west side.

Indian cay lies close off the north-west point of Bahama island, leaving between a channel for small craft drawing 6 feet, round to the settlements on the north side of the latter island.

BAHAMA ISLAND.

This island is 65 miles in length east and west, and from 5 to 7 in breadth. It is inhabited, thickly wooded, but generally level, and about 40 or 50 feet high. At Settlement point, the west end, it is a mile broad, north and south, and anchorage will be found under it in 8 or 9 fathoms water, about half a mile off shore, with the north-west point bearing N.E. by E., and the south-west point S.S.E. $\frac{1}{2}$ E., but a vessel must quit the moment the wind threatens to change.

From Settlement point the southern shore trends S.E. by E. 22 miles to S.W. point. Soundings appear to extend off a short distance, and anchorage is marked on the chart under the latter point,—but this part of the island is very little known. Thence the coast line takes an E.N.E. direction, and towards the east end of the island sweeps round to the southward, forming a deep and dangerous bight with southerly winds. This part appears to have a foul shore the whole way, without any anchorage; but it is also

very imperfectly known. From the south-east extreme of the island the edge of the Little Bahama bank trends to the south and round to the south-east and connects itself to the west side of Abaco at Rocky point. It is skirted by numerous small islets and dangerous ledges without any navigable openings between them as far as Gorda cay, which lies N.W. by W. 9 miles from Rocky point.

Water.—There is anchorage under the west side of Gorda cay, and water may be obtained in small quantities.

Soundings extend $1\frac{3}{4}$ miles south of Gorda cay, but this part as far as Rocky point has not been thoroughly examined.

Cross harbour.—From Rocky point the coast of Great Abaco island trends to the south-east, forming a large bight between it and Cedar point, eight miles distant; this bight is shallow and full of rocky ledges almost to the edge of soundings.

CHAPTER XI.

THE FLORIDA CAYS AND STRAIT, FROM THE TORTUGAS TO
CAPE CANAVERAL.

 VARIATION in 1887.

Tortugas, 3° 40' E.		Cape Florida, 2° 35' E.
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THE FLORIDA CAYS.

This range* of low mangrove and wooded islands, commencing at the south-east extreme of the Florida peninsula, sweeps round to the south-west and west, nearly 200 miles. Several of them are inhabited, and at cay West there is a large settlement and good harbour, where water and other supplies may be obtained, and the repair of damages easily effected. Throughout their whole extent they are skirted, to the distance of from 4 to 6 miles, by dangerous narrow coral reefs, which are steep-to, and through which there are several cuts leading into a navigable channel within for vessels of the heaviest draught, as far up from the westward as cay West; for those drawing under 16 feet, as far on as the cay Vaccas; and for others of very light draught, thence to cape Florida. This latter portion, however, is extremely intricate, and the features of the islands resemble each other so closely that the navigation depends almost entirely upon the eye, with the assistance of the several beacons and lighthouses on the reefs.

Day-marks along the Florida reefs.—Beacons as day-marks have been erected along the Florida reefs, from Sand cay lighthouse north-eastward to cape Florida. These beacons occupy the positions of the signals used in the United States coast survey of these reefs, and consist of iron shafts 36 feet high, erected upon iron screw foundations, distinguished by vanes marked by a letter, and above them a lattice-work hoop-iron cylinder or barrel. They are painted *black*, *white*, and *red*, and so combined that no two adjacent beacons have the same colours upon like parts. The mariner may ascertain his latitude and longitude with tolerable certainty by examining closely the colours of the beacons as they are

* See Admiralty charts:—West Indies, sheet 1, Florida strait, No. 1,217, scale, $m = 0.06$ of an inch; and Boca Grande to Tortugas cays, No. 525, scale, $m = 0.5$ of an inch.

approached, and if the letter painted on the vane be distinguished, there can be no mistake in determining his position.

The beacons are placed on the most projecting and dangerous points of the reefs, and are in general from 4 to 6 miles from the outside (seaward) shores of the Florida cays, and within half a mile, in every case, of the edge of the Gulf stream. The depth of water where they stand does not exceed 4 feet at low tide; and just to seaward of them in the stream, it deepens quickly to 50 and 100 fathoms.

The beacons may be approached from seaward within a few hundred yards; but it would always be prudent, and particularly with very light winds, or in bad weather, to give them a wide berth. In moderate weather it often happens, especially after easterly gales, that the force and direction of the Gulf stream sets across the reefs, and then vessels are imperceptibly carried amidst the dangers, although the course steered should, if made good, carry them outside all. When the mariner finds one of these beacons to the eastward of him, he may be sure that he is between the reefs and the cays, and consequently surrounded by shoals and dangerous rocks.

Tortugas islands,* sometimes called the Dry Tortugas, is the westernmost group of cays, occupying a space of about 9 miles north-east and south-west, and 6 miles north-west and south-east. They are all very small, and partially covered with brushwood to the height of a few feet, and cannot be seen more than 12 miles off. Several sheltered anchorages will be found within the group; and eastward of Garden cay,† which lies near the middle of the southernmost islets, there is a small inlet of deep water, where a vessel of large draught may careen alongside the cay. The soundings all around are very irregular, and of little assistance when the lights are not visible.

Loggerhead cay is the western and largest of the Tortugas group, and the most western of the Florida cays. It is nearly one mile in length, north-east and south-west, 700 feet in breadth, and bordered all round by cedar bushes. Anchorage in 7 fathoms water will be found off its west side, but exposed to the wind from that quarter. A small cay lies about one mile to the south-west of it, called South-west cay, from which a ledge, with from 2 to 8 feet on it, extends half a mile to the south-west.

LIGHTS.—A circular brick tower, lower half white, the upper black, and 150 feet high, stands on the middle of Loggerhead cay, and exhibits a

* From the U.S. coast survey, 1874.

† See plan on Admiralty chart, Boca Grande to Tortugas cays, No. 525, Garden cay anchorage, scale, $m = 3.0$ inches.

fixed white light, 152 feet above the sea, which is visible in clear weather 19 miles. It bears West 3 miles from the *fixed* light in fort Jefferson on Garden cay, which formerly served as the only guide when passing this dangerous locality, and which is now continued as a harbour light, visible 13 miles.

Tortugas bank,* an irregular bank of coral rock with patches of sand and broken shells, lies westward of the islands; within the 10-fathom line it is nearly 6 miles long north-east and south-west, and $3\frac{1}{2}$ broad, leaving a channel 3 miles wide, of from 16 to 19 fathoms, between it and the cays. Near the centre of the bank W. $\frac{1}{4}$ S., 7 miles from the lighthouse on Loggerhead cay, is a depth of 6 fathoms. A depth of 20 fathoms will be found 4 miles south, and 30 fathoms 2 miles west of the bank. The 100-fathom line is about 15 miles southward of the Tortugas.

The southern edges of the cays and the approach to the anchorages through the N.W. channel are buoyed.

Tides.—It is high water, full and change, at the Tortugas at 9h. 56m. Springs rise $1\frac{1}{2}$ feet. The flood sets to the northward, the ebb to the E.S.E., but their direction is said to be variable, and influenced by the Gulf stream.

Western channel.—Between the Tortugas and the west end of the Florida reefs (or Marquesas sands) there is an opening about 18 miles wide. The channel is free of danger with the exception of the Rebecca and Isaac shoals, and frequently used by vessels bound to the ports on the west side of the peninsula of Florida. The west end of Marquesas spit is pointed out by a spar beacon painted *white*, and 3 feet above the sea. The beacon is in 15 feet water, but it is frequently washed away, and it will therefore be better to pass westward of the Rebecca shoal. The soundings will be found irregular, varying from 8 to 16 fathoms.

Rebecca shoal lies about 6 miles westward of the Marquesas sand spit (or Half Moon shoals), and $12\frac{1}{2}$ miles E. by S. $\frac{1}{4}$ S. from East cay of the Tortugas. It is a coral bank about half a mile in extent, with a least depth of 7 feet. About $1\frac{1}{2}$ miles to the south-east is Isaac shoal.

LIGHT.—From a pile lighthouse with dwelling house, painted white, erected on Rebecca shoal, is exhibited, at an elevation of 67 feet above the sea, a light which flashes alternately *red* and *white*, the interval between the flashes being *five seconds*; and visible about 14 miles in clear weather.

Marquesas cays are the westernmost of the Florida chain, and from hence eastward there is no navigable opening of any great extent.

* See Blunt's American coast pilot, 20th edition, from which a great part of the description of the Florida cays is taken.

These islets lie almost in a circle, about $3\frac{1}{2}$ miles in diameter, 36 miles eastward of the Tortugas, and about 6 miles from the outer edge of the Florida reefs. A dangerous bank of quicksand, from 6 to 9 miles in breadth, extends from them 15 miles westward. Eastward of these cays the depths on the bank are very irregular, and it should not be crossed.

Boca Grande.—A cluster of cays lies on a shallow bank, about 11 miles in extent east and west and 6 miles north and south, and separated from the Marquesas cays by a channel about 3 miles wide, called the Boca Grande, in which the depth is nearly 12 feet. The three southernmost cays are distinguished by having sandy beaches. Eastward of these cays the depths on the bank are very irregular, and it should not be crossed.

CAY WEST* is $3\frac{1}{4}$ miles in length, nearly east and west, with an average breadth of about a mile. The town at the north-west end of the island is strongly fortified, and contains a population of about 3,500. Coals and water may be obtained, and defects made good. Owing to the number of casualties happening to ships through getting on the Florida reefs, the U.S. Government has organised an establishment at cay West, consisting of several licensed vessels, which are kept cruising on the look-out for vessels in distress or in want of pilots.

LIGHTS.—The lighthouse on the western part of the island, southward of the town, is white, and exhibits, 72 feet above the sea, a *fixed* white light visible 14 miles.

On Sand cay, about $7\frac{1}{4}$ miles S.S.W. $\frac{3}{4}$ W. from cay West lighthouse, is an iron screw pile lighthouse, painted brown with a white lantern. At 110 feet above the sea it shows for a space of *one minute* a clear steady light; in every alternate minute there is a brilliant *flash* of 10 *seconds* duration, preceded and followed by eclipses of 25 *seconds* duration; and is visible 17 miles.

Buoys.—The main ship channel to cay West is pointed out by the following buoys:—

A fairway can buoy, striped *black* and *white* vertically, in 5 fathoms, with cay West lighthouse N. $\frac{1}{4}$ W., and Sand cay lighthouse W. by S. $\frac{3}{4}$ S.

Two *red* and two *black* nun buoys mark the shoal patches, called the Triangles, about 2 miles northward of the fairway.

A *red* nun buoy, in 18 feet water, on the south-west end of the ledge running off a long half mile from Whitehead point, with the lighthouse bearing N.E. $\frac{1}{2}$ N., $1\frac{1}{10}$ miles.

Middle Ground beacon.—Near the south-east extreme of the Middle ground there is a beacon shaft (No. 3), octagonal in shape,

* See Admiralty plan :—Cay West harbour and approaches, No. 2,881, scale, $m = 1\cdot4$ inches.

surmounted by an octagonal box. The shaft, top of the cage, and the box are pointed *black*; the sides of the cage are *white*. From the beacon, cay West lighthouse bears N.E., and Sand cay lighthouse S. by E.

Tides.—It is high water, full and change, at Sand cay at 8h. 40m.; springs rise 2 feet, neaps one foot. Cay West 9h. 22m.; springs rise $1\frac{1}{2}$ feet; and on the bar of the North-west channel at 11h. 10m.; springs rise $3\frac{1}{2}$ feet, neaps $1\frac{3}{4}$ feet.

Directions.*—In entering the east channel, keep the east side of cay West lighthouse in line with Filor's observatory, bearing N.W. by N., leaving No. 5 beacon on the port hand. When West Sambo bears E. $\frac{1}{2}$ S. steer W. $\frac{1}{2}$ N. until the lighthouse is in line with O'Hara's observatory N.N.W. $\frac{1}{2}$ W.; then keep these latter marks on until Sand cay bears S.W. $\frac{1}{4}$ W., when steer W. by N. $\frac{3}{4}$ N. with the east end of A or Snipe cay in line with the south end of Mullet cay. When the lighthouse bears N.E. steer N.N.E., with Tift's and Filor's observatories in one. When off the fort steer N. $\frac{1}{2}$ W., and anchor off the Lazaretto in $4\frac{3}{4}$ fathoms water; or steer for the west edge of Fleming cay, give the wharves, alongside which large vessels load, a berth, and anchor off the town. The least depth of water in this track will be $4\frac{1}{4}$ fathoms. It is advisable to moor, as the holding ground is not good and the tides are strong.

South-east channel.—A new channel called the South-east channel, just eastward of the East channel, is buoyed as follows:—A first-class nun buoy, No. 2, is placed close to the 17-foot shoal at its entrance, about S.E. from cay West Lighthouse; a second-class nun buoy, No. 4, on a 15-foot spot about two miles from the first buoy; and a second-class nun buoy with perpendicular stripes about two miles N.W. of the last buoy; this latter buoy forms a continuation of the Hawks channel, and also completes the South-east channel. The advantages of this channel are great for sailing vessels, there is not less than 17 feet, and generally a fair wind, which would be nearly ahead in the main channel. East and Point of Reefs channels to cay West harbour are never used, and the buoys marking them have been removed.

Main Ship channel.—Bring cay West lighthouse to bear N. $\frac{1}{2}$ W. and steer for it until Sand cay lighthouse bears W. by S., then steer N. $\frac{3}{4}$ W., passing close eastward of the fairway buoy. When Sand cay lighthouse bears S.W. by W., it is better to anchor and wait for a pilot if the vessel draws more than 16 feet water. Drawing less than 16 feet, continue on through the Triangles, leaving the two *black* buoys on the port hand, and the two *red* on the starboard. After passing the northern of these buoys, keep on N. $\frac{3}{4}$ W. for a quarter of a mile, then steer N.W. by N.,

* See enlarged plan, scale, $m = 2.4$ inches, on Admiralty plan, No. 2,881.

passing about a cable westward of Whitehead spit buoy, when haul up N. by E., and anchor abreast of fort Taylor, if without a pilot. A vessel will carry $4\frac{1}{2}$ fathoms water on these courses.

At night, if clear, bring the North star over cay West light and stand for it; when the light on Sand cay bears S.W. by W., a vessel of over 16 feet draught had better anchor and wait for a pilot.

A dangerous coral head, with 13 feet water on it, lies W.S.W. $2\frac{1}{2}$ cables from the fairway buoy. On the East dry rocks, about 2 miles farther westward is beacon, No. 4.

Rock Cay channel.—Bring the west end of West Crawfish cay in line with the middle of Snipe cay, bearing N. by W. $\frac{1}{2}$ W., and steer for it. When the Middle ground beacon bears W.N.W., and in line with Man cay, steer N.N.E. $\frac{3}{4}$ E. for Tift's observatory. When the lighthouse bears N.E., bring Tift's and Filor's observatories in line, and proceed as before.

Sand Cay channel.—With Sand cay lighthouse bearing N.E. $\frac{3}{4}$ E., bring the western end of Snipe cay to bear N. $\frac{1}{4}$ E. and steer for it; or bring East Crawfish cay to bear N. by E. $\frac{1}{2}$ E., and steer for it. When cay West lighthouse bears N.E. $\frac{1}{2}$ E., keep it on that bearing until Tift's and Filor's observatories are in line, then proceed as before.

West channel.—When beacon No. 2 on Western dry rocks and Sand cay lighthouse are in line bearing E. by N. $\frac{1}{4}$ N., bring cay West lighthouse to bear N.E. $\frac{1}{2}$ E., and steer for it until beacon No. 3 on the Middle ground is in line with Sand cay lighthouse, bearing S. by E. $\frac{1}{4}$ E., then steer N.E. by E. $\frac{1}{4}$ E. for $3\frac{1}{2}$ miles towards Rocky point, until the north-west angle of fort Taylor is just on with the Lazaretto bearing N.E. by N. $\frac{1}{2}$ N., steer in on this line until abreast Whitehead spit buoy, when proceed as before.

North-west channel.—An extensive group of islets and cays lie on a bank about 30 miles in length E.N.E. and W.S.W., eastward of cay West. These cays and bank are separated from Mangrove shoals on the west, by an opening called North-west channel, the banks of which are plainly visible, and will serve as a guide; the bar has 17 feet water on it, but the channel is only 60 feet wide. At night, without a pilot vessels incur great risk of running on shore, and even with one on board it is not easy to go clear. This channel although intricate, will be found very convenient for small vessels when bound to, or coming from the north-west, instead of passing round the Tortugas.

LIGHT.—On the flats, $1\frac{1}{2}$ miles inside the bar of the north-west channel, is an iron screw-pile lighthouse, painted red, and the dwelling and lantern white. It exhibits, 40 feet above the sea, a *fixed* white

light, visible from the northward 12 miles when bearing from S.E. by E. to S.W. A ray of *red* light, to guide across the bar of N.W. channel, is visible through an arc of 4° , or between the bearings of S. by W. and S. by W. $\frac{3}{4}$ W., its eastern edge just covers the line of buoys across the bar, and its western edge guides clear of the $8\frac{1}{2}$ -foot shoal on the western side of the channel. The bell buoy is in the axis of the ray.

Buoys.—North-west channel is also pointed out by the following and several other buoys:—

A bell buoy lies in about 4 fathoms, with the pile lighthouse bearing S. by W. $\frac{1}{8}$ W., distant $1\frac{3}{4}$ miles.

A nun buoy (*black*) is moored on the bar in 11 feet water, with the pile lighthouse, in line with the west end of Mullet cay, bearing S. by W. $\frac{3}{4}$ W.

A *red* nun buoy, in 15 feet water, with the pile lighthouse S. by W. $\frac{3}{4}$ W. distant three-quarters of a mile.

A *black* nun buoy, in 24 feet water, on north-west tail of Middle ground, with the east end of Crayfish cay S. $\frac{3}{4}$ W., and Flemings cay E. by S. $\frac{1}{2}$ S.

A *black* and *white* striped nun buoy, in 27 feet water, in mid-channel, with cay West lighthouse S.E. by E. $\frac{1}{2}$ E., and Flemings cay E. by N. $\frac{1}{2}$ N.

Directions—to pass through this channel to the gulf of Mexico, without stopping at cay West. When the inner buoy off Whitehead point bears S.E. $\frac{3}{4}$ S., and cay West lighthouse is in line with the south end of the fort, steer N.W. $\frac{3}{4}$ N., passing close eastward of the mid-channel buoy, until Filor's observatory is seen between the northern and middle churches, bearing S.E. $\frac{3}{4}$ E., when the N.W. buoy of the Middle ground will be close to; then, with the above mark, steer N.W. $\frac{3}{4}$ W., until the pile lighthouse bears S. by W. $\frac{3}{4}$ W., and in line with the west end of Mullet cay; the course will then be N. by E. $\frac{3}{4}$ E. for the bar buoy, passing it close on either side. A shallow patch with 9 feet water on it is said to lie N.N.E. $\frac{1}{4}$ E., $8\frac{1}{2}$ miles from the pile lighthouse of North-west channel, but its existence is doubtful.

Entering this channel from the northward, bring the bell buoy on with the pile lighthouse, and steer on this line, passing close to the buoy on either side; and then steer S. by W. $\frac{1}{8}$ W. for the pile light, which will clear all dangers. When Filor's observatory is seen between the northern and middle churches, bearing S.E. $\frac{3}{4}$ E., steer with this mark on for the N.W. buoy of the Middle ground, when abreast it the west end of Snipe cay will be in line with the west end of Woman cay; then steer S.E. $\frac{3}{4}$ S. until Tift's and O'Hara's observatories are in one, when stand for the wharves.

When obliged to enter this channel at night from the gulf of Mexico, get within the limits of the *red* ray of light, bearing S. by W. $\frac{1}{8}$ W., and

steer for it. After passing the bar anchor anywhere to the northward of the lighthouse in from 16 to 18 feet. In anchoring at cay West, avoid a 7-fathom rocky hole, bearing N.W. by W. 160 yards from Tift's observatory; vessels dropping their anchors in it will lose them.

Sambo cays.—These three small low cays lie on the edge of the Florida reefs. The western Sambo bears E. by N. $\frac{1}{2}$ N. $8\frac{3}{4}$ miles from Sand cay lighthouse, and S.E. by E. $6\frac{1}{4}$ miles from cay West lighthouse. The middle Sambo lies E. by N. $\frac{3}{4}$ N. $2\frac{1}{2}$ miles from the above, and about three-quarters of a mile westward of the eastern Sambo. In the opening between the two former, $3\frac{1}{2}$ fathoms may be carried across the reef, and between the latter cays 3 fathoms, but this cut is very narrow.

The Eastern Sambo beacon has letter A painted on vane, *white*; hoop-iron lattice-work cylinder, *black*; and shaft and vane, *red*. It bears S. by E. $\frac{3}{4}$ E., about 4 miles from the south-east point of Boca Chica.

American Shoals beacon* has the letter B painted on vane, *black*; hoop-iron latticework cylinder, *red*; and shaft and vane, *white*. It bears S. by W. $\frac{1}{2}$ W., nearly 6 miles from Loggerhead cay, and E. by N. $\frac{3}{4}$ N., rather more than 8 miles from Sambo beacon. With Loggerhead cay bearing N.N.W. $\frac{1}{2}$ W. there is a channel across the reef, carrying $3\frac{1}{2}$ and 4 fathoms water.

LIGHT.—A lighthouse is placed in 6 feet water and 200 feet north-west of beacon B, it consists of an iron frame work resting on a pile foundation. The keeper's dwelling is 38 feet above the water connected with the lantern by a spiral staircase which is painted white, the rest of the entire structure is painted brown, from which is exhibited at an elevation of 109 feet a flashing white light, showing a flash every five seconds, and visible 16 miles.

Looe cay lies E.N.E. about 14 miles from the eastern Sambo, and about 4 from the nearest of the Pine islands. On it is erected a *white* tower, 30 feet above the sea, with a staff and *red* ball (beacon No. 6). The Florida reef from here to Sambo cays is full of dangers. The cays from abreast this islet as far as Bahia Honda, 10 miles to the eastward, are covered with pine trees, and north of the eastern Sambo they form a remarkable saddle.

Bahia Honda.—From cay West eastward for 30 miles to Bahia Honda there are nothing but low mangrove islands forming channels fit only for canoes. The islands eastward of Bahia Honda are somewhat

* See Admiralty chart:—Lower Matacumbe cay to Boca Grande cay, No. 1,098, scale, $m = 0.5$ of an inch.

larger, and covered with pine trees, but are low and drowned like the others, and the channels between them are fit only for boats. Of the whole of these islands there is only one, 13 miles from cay West, of tolerable height; it is rugged, covered with trees, and in whatever direction seen appears in the form of a saddle. Bahia Honda or Cabbage tree cay is about 2 miles in length, has a sandy beach, and numerous palmetto trees on it, which are the first seen coming from the westward.

Between Bahia Honda and three small cays west of it is a narrow but snug inlet, with a depth of about 18 feet, and vessels of 7 or 8 feet draught may pass right through to the north-west. The entrance at the east end of the Pine islands is about 10 miles West of Sombrero cay lighthouse.

Water.—There is good fresh water on Bahia Honda cay.

Sombrero cay lies E.N.E. $16\frac{1}{2}$ miles from Looe cay, and South $3\frac{1}{2}$ miles from the west end of Boot cay. There are shallow patches eastward of Looe cay for about $4\frac{1}{2}$ miles, but thence to Sombrero there is not less than $2\frac{3}{4}$ fathoms; it would, however, be running a risk to cross anywhere, except in the channel, to Bahia Honda.

From Bahia Honda to cay Vaccas the distance is about 8 miles. In this space there are only a few small cays, which makes it remarkable. Westward of cay Vaccas there is a narrow channel, 7 feet deep, leading out to the north-west, and to the eastward of this the openings are only fit for canoes.

LIGHT.—On Sombrero cay is an open framework of iron, built on iron piles, the whole structure being 149 feet high and painted brown, which exhibits at 144 feet above the sea a *fixed* white light, visible 19 miles. The keeper's dwelling is square, and there is a cluster of cocoa-nut trees over it. An American flag is hoisted daily on a flagstaff above the lantern.

Vaccas or Cow cay is one of a narrow range of islets closely clustered together, extending in a N.E. by E. direction 14 miles. They are thickly wooded, and near the centre, both on the north and south sides, there are springs of excellent water. To the west end of these cays a vessel of 14 feet draught may work up in the daytime, within the Florida reefs, observing that the depth will generally be about 3 fathoms, when a mile from the cays, although in places there may be shallower water, and that the deepest water will be found on the side of the reefs. To the eastward of this the reef becomes exceedingly dangerous, and the channel within, in places, so contracted by shoals as to be only navigable for vessels of very light draught. The usual method of navigation between the reefs and the cays, is to proceed in the day, and anchor at night. Conch cays

are separated from Long cay by a shallow opening about $1\frac{1}{2}$ miles wide. At the entrance there are 11 feet water, but only 8 feet within.

Coffin patches.—About 10 miles N.E. by E. $\frac{1}{2}$ E. of Sombrero cay, and 4 miles S.E. by S. of Crawl cay, there is a small dry ledge of rocks called Coffin patches, near the outer extreme of which stands beacon C.

Duck cay cut.—With the east end of Duck cay bearing N.N.W. $\frac{3}{4}$ W., a vessel may cross the Florida reef in from 3 to 4 fathoms.

Long cay is about $3\frac{1}{2}$ miles long, east and west, and remarkable from having a white sandy beach, and at its western end a wooded hill. Three miles S.E. of the east end of this cay is the centre of the Tennessee reef, extending north-east and south-west over a space of about 3 miles, with 11 feet the least water on it; the outer extreme of these shoals is marked by beacon No. 7.

Lower Matacumbe cay,* separated from Long cay by an opening about 3 miles wide, is about $3\frac{1}{2}$ miles long north-east and south-west, and the north-east end is covered with some lofty trees, having the appearance of table land. At this end and on the north side there are in the rock some wells of excellent water. Three-quarters of a mile eastward of the north-east point there is a small islet called Indian cay, and close round the east side of this islet a narrow channel runs to the northward, in which there is a depth of nearly 3 fathoms; but there is a bar across the entrance with only 9 feet water on it.

Tides.—It is high water, full and change, at Lower Matacumbe cay at 8h. 23m.; springs rise $2\frac{1}{2}$ feet, neaps $1\frac{3}{4}$.

Alligator reef.—About $3\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. of the south-west end of Upper Matacumbe cay, and the same distance E.S.E. from Indian cay, there is a coral patch on the Florida reefs with only 2 feet water on it, called Alligator reef.

LIGHT.—Near the north-east part of the Alligator reef, in 5 feet water, and within 200 yards of the deep water of the gulf, stands a white iron framework with black lantern, from which is shown, 143 feet above the sea, a *flashing white and red* light, flashing *every 5 seconds* and *every third flash is red*, visible in clear weather 18 miles.

Vessels approaching this light from the northward should not bring it to bear southward of S.W. by W., and approaching from the southward and westward should not bring it eastward of N.E.

From the lighthouse, Carysfort lighthouse bears N.E. $\frac{1}{2}$ N., 31 miles, and Sombrero lighthouse S.W. by W. $\frac{1}{4}$ W. 30 miles.

* See Admiralty chart:—Cay Biscayne to Lower Matacumbe cay, No. 1,097, scale, $m=0\cdot5$ of an inch.

Indian cay.—Of all the Florida cays this may be the most readily distinguished. It is a wrecking station, and has five or six houses on it; but, with the exception of a few tall cocoa-nut trees, the cay is destitute of all vegetation. With Indian cay bearing from N. $\frac{1}{2}$ W. to N.W. by N., the water gradually shoals to 17 feet, 2 miles from the cay.

Upper Matacumbe cay, lying 2 miles to the north-east of Lower Matacumbe, is $3\frac{1}{2}$ miles long, and covered with lofty trees. At its east end there is a well of good water.

Long Island and Cay Largo, north-east of Upper Matacumbe, are only separated by very narrow cuts 6 feet deep, through which the tide runs with great velocity. The latter cay, and those to the northward of it, trend about N.N.E. $\frac{1}{2}$ E. The Florida reefs form a corresponding elbow, and is here called the Carysfort reef. Nearly a mile eastward of the south end of cay Largo there is a small mangrove islet, called Tavanier cay, and on its north side there is anchorage for wreckers of 8 feet draught; about 5 miles N.E. by E. of this, and $1\frac{1}{2}$ miles from cay Largo, is a larger islet called Rodrigues cay. Between it and the shore is Dove islet, a small gravelly cay of moderate height, which affords good water in the rainy season.

Cay Largo is about 25 miles long, and its northern part is nearly connected to the Florida peninsula. Near the middle of the island, N.E. by N. $8\frac{1}{2}$ miles from Rodrigues cay, and about S.W. by W. $\frac{1}{2}$ W., 8 miles from the Carysfort lighthouse, there is a remarkable rocky headland, called Sound point.

Crocker reef beacon has letter D painted on vane, *white*; hoop-iron lattice-work cylinder, *black*; and shaft and vane, *red*.

Conch reef beacon has letter E painted on vane, *black*; hoop-iron lattice-work cylinder, *red*; and shaft and vane, *white*. It bears S.E. $\frac{1}{4}$ S. $3\frac{1}{2}$ miles from Tavanier cay.

Davis and little Conch reefs lie in a line between Crocker and Conch reef beacons.

Pickles reef beacon has letter F painted on vane, *red*; hoop-iron lattice-work cylinder, *white*; and shaft and vane, *black*. It bears S.S.E. about $5\frac{1}{4}$ miles from Charles point, and 4 miles from Rodrigues cay.

French reef beacon has letter G painted on vane, *white*; hoop-iron lattice-work cylinder, *black*; and shaft and vane, *red*. It bears S. by E. $\frac{1}{2}$ E. 6 miles from Willie point.

Grecian shoal beacon has letter H painted on vane, *black*; hoop-iron lattice-work cylinder, *red*; and shaft and vane, *white*. It bears S.E. $\frac{1}{2}$ E.

nearly 4 miles from Sound point, and S.W. by W. about $2\frac{1}{2}$ miles from the Elbow beacon.

Elbow beacon, has letter I painted on vane, *red*; hoop-iron cylinder, *white*; and shaft and vane, *black*. It bears N.E. by E. about $2\frac{1}{2}$ miles from Grecian shoal beacon, and S.S.W. $\frac{1}{4}$ W. $5\frac{1}{2}$ miles from Carysfort lighthouse.

Carysfort reef.—From about the parallel of 25° N., the reef takes nearly a N.N.E. direction 45 miles, to within about 3 miles of the east side of cay Biscayne. The whole of this part is extremely dangerous. There are several narrow intricate openings, through which vessels are sometimes thrown by chance into a deep hole within the reefs; but no other guide can be given than the eye.

LIGHT.—An iron lighthouse of a dark colour, with white lantern, on screw piles, is erected on the Carysfort reef near the edge of the Gulf stream, and eastward of the northern part of cay Largo. It exhibits, at 106 feet above the sea, a *revolving* white light, showing a bright *flash* every *half minute*, and visible 17 miles. An American flag is hoisted by day above the lantern.

Turtle Reef beacon, has letter K painted on the vane, *white*; hoop-iron lattice-work cylinder, *black*; shaft and vane, *red*. It bears about S.S.E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles from Old Rhodes cay, and N. $\frac{1}{4}$ W. $3\frac{1}{2}$ miles from Carysfort lighthouse.

Turtle harbour, formed by the reefs about 4 miles northward of Carysfort lighthouse, is easy of access, and the depth of water at the entrance of the channel is 26 feet. With Carysfort lighthouse bearing S. $\frac{3}{4}$ W., distance $4\frac{1}{2}$ miles, and the beacon K on Turtle reef S.W. $\frac{1}{2}$ W., in 5 fathoms water, white bottom, steer W. by S. $\frac{1}{2}$ S.; give the beacon on Turtle reef a berth of half a mile, and when the beacon bears S.E. $\frac{1}{4}$ E. haul up S.W. $\frac{1}{2}$ S. till the beacon bears E. $\frac{1}{2}$ N., then anchor in 5 fathoms, soft clay. The soundings are regular; some spots, however, give half a fathom less than the clear bottom.

Pacific Reef beacon, has the letter L painted on vane, *black*; hoop-iron lattice-work cylinder, *red*; and shaft and vane, *white*. It bears E. by N. $\frac{1}{2}$ N. $5\frac{1}{2}$ miles from the south end of Old Rhodes cay, and S. $\frac{3}{4}$ W. 2 miles from Ajax reef beacon.

Ajax Reef beacon, has the letter M painted on the vane, *red*; hoop-iron lattice-work cylinder, *white*; and shaft and vane, *black*. It bears E. by N. $\frac{1}{4}$ N., nearly $5\frac{1}{2}$ miles from the south end of Elliotts cay, and S. $\frac{1}{2}$ W. $2\frac{3}{4}$ miles from Long reef beacon.

Long Reef beacon, has the letter N painted on vane, *white*; hoop-iron lattice-work cylinder, *black*; and shaft and vane, *red*. It bears S. by W. nearly 2 miles from Triumph reef beacon.

Triumph Reef beacon, has the letter O painted on vane, *black*; hoop-iron lattice-work cylinder, *red*; and shaft and vane, *white*. It bears S.S.E. $\frac{1}{4}$ E. $7\frac{1}{4}$ miles from Soldier cay.

LEGARÉ ANCHORAGE* is within the reefs off Sand cay and the north end of Elliotts cay. To sail in southward of Triumph reef, bring Long reef beacon to bear West distant one mile, and Triumph reef beacon N. by W. $\frac{1}{2}$ W. distant 2 miles; then a course N.W. by N. will lead to Legaré anchorage, through a passage between the reefs 3 cables wide, carrying 22 feet water. To sail in northward of Triumph reef, bring Triumph beacon to bear S.W. $\frac{3}{4}$ S. distant $1\frac{3}{4}$ miles; then steer W. $\frac{1}{4}$ S. until Triumph and Long reef beacons are in line, when the course will be S.W. by W. to the anchorage through a passage 4 cables wide, and the depth 20 feet.

When Triumph reef beacon bears S.W. $\frac{3}{4}$ S. distant $1\frac{3}{4}$ miles, a course N.W. $\frac{1}{2}$ N. will lead to an anchorage inside Star reef, through a passage $2\frac{1}{2}$ cables wide, with 22 feet water. There is also a passage northward of Star reef, 3 miles southward of Fowey rocks beacon, 130 yards wide, with a depth of 22 feet.

Fowey Rocks beacon, has the letter P painted on vane *red*; hoop-iron lattice-work cylinder, *white*; and shaft and vane, *black*. It bears S.E. $\frac{1}{2}$ S. $5\frac{1}{2}$ miles from cape Florida lighthouse, and E. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from Soldier cay, and is the northernmost beacon.

LIGHT.—A lighthouse, painted dark brown, is erected 50 yards south of beacon P in 5 feet water on iron framework having a pile foundation; the keeper's dwelling is 38 feet above the sea, and it is connected to the lantern by a cylindrical staircase, which, with the dwelling, is painted white. The light is a fixed white light 110 feet above high water, visible 16 miles.

Soldier cay lies South $4\frac{1}{2}$ miles from the old Florida lighthouse (or cape Florida). It is about a cable in diameter, and covered with high trees.

Little Soldier cay lies about a quarter of a mile southward of Soldier cay, and is much smaller and lower.

* See Admiralty plan :—Legaré anchorage, No. 2,884, scale, $m = 3 \cdot 5$ inches.

CAPE FLORIDA.—Cay Biscayne is nearly 4 miles in length north and south, and between it and the main land, $2\frac{1}{2}$ miles north of it, is Virginia cay. The south end of cay Biscayne is called cape Florida, and the 5-fathoms line of soundings is from about $2\frac{1}{2}$ to $3\frac{1}{2}$ miles distant from the cay. At the former distance, however, eastward of cape Florida, there are shallow patches with as little as 2 fathoms water on them. To the northward of Fowey rocks, vessels of light draught may thread their way over the shallow water, between the reefs, to an anchorage within the rocks westward of cape Florida. The shoals may be seen in clear weather, and the pilotage must be conducted by the chart, the eye, and lead.

The passage inside the reefs is used by wreckers and other small vessels; sailing directions would be useless. The buoys marking the channel are the best guide; those painted black with odd numbers being on the western bank, and those painted red with even numbers on the eastern bank.

Old light tower.—On cape Florida, the south point of cay Biscayne, stands a white tower,* 95 feet high. It bears W. $\frac{1}{4}$ N. 46 miles from Gun cay lighthouse, and this is the narrowest part of the Florida strait; there is a cluster of cocoa-nut trees near it.

Tides.—It is high water, full and change, at cape Florida at 8h. 36m.; springs rise $1\frac{3}{4}$ feet, neaps $1\frac{1}{2}$ feet. The flood runs W.N.W., the ebb E.S.E., and both with great velocity. To the northward of cay Biscayne the tidal stream is much influenced by the wind; generally the ebb sets to the northward, the flood to the southward.

Cay Biscayne bay is formed between the cays and the east coast of Florida. It extends over a space of about 20 miles, and is from 3 to 8 miles in breadth, having from 3 to 13 feet water.

Approaches to the Inside of the Reefs.—The first or north entrance:—When Bears cut, between Virginia and Biscayne cays, is open bearing W. by S. $\frac{1}{4}$ S., steer for it until the lighthouse bears S.S.W. $\frac{1}{4}$ W.; then steer South, which will lead down inside Fowey rocks in 20 feet water, avoiding the shoal patches.

The second entrance:—When the lighthouse bears W. by S. $\frac{1}{4}$ S. steer for it until Soldier cay—the first cay southward of the lighthouse—bears S.S.W.; then steer South, which will lead down in 20 feet water.

The third entrance:—Bring Soldier cay to bear S.W. $\frac{1}{4}$ W., and steer for it until the lighthouse bears N.W. $\frac{1}{2}$ N.; then steer South. These courses, if made good, lead inside Fowey rocks in 20 feet water; but a vessel will be liable, from the set of the current or wind, to pass over a spot of a single cast of the lead, with 17 feet water on it.

* This is the old disused lighthouse; it will probably be demolished.

Entrance to Cay Biscayne bay.—Having crossed inside the reefs by any of the above passages, steer South until Soldier cay bears W. $\frac{1}{2}$ S., then steer for it. When three-quarters of a mile from the cay, the lighthouse will bear N. by W. northerly, then steer North. These courses will carry a vessel in nothing less than 9 feet at low water up to the bar lying just southward of the Swatch channel, which has only 8 feet on it at low water, and which should be crossed eastward of its middle, as there is a spot with 6 feet on it, about midway between the banks on either side.

To avoid this spot, a vessel when up with the southern edge of the bar should have the lighthouse bearing N.N.W. $\frac{1}{2}$ W.; cross the bar steering North. When the lighthouse bears N.W. by N., the sandy beach westward of the lighthouse will be in line with the western extreme of trees on cay Biscayne; then steer on this line N.W. $\frac{1}{4}$ N. until the lighthouse bears N.N.W. $\frac{1}{4}$ W., when run in by the eye between the banks on a N.W. $\frac{3}{4}$ W. course, giving the sandy beach a small berth, and anchor.

Port Dallas.—When halfway between the Swatch channel and the lighthouse, a vessel may steer on by the eye between the banks on either side until within the bay. When fort Dallas bears North, Steer N. $\frac{1}{2}$ E. $4\frac{3}{4}$ miles; when the fort bears N. by W. $\frac{1}{2}$ W. steer N.N.E. $\frac{1}{2}$ E. nearly a mile; when the fort bears N.W. $\frac{1}{2}$ W. steer N. by E. $\frac{1}{2}$ E. one-third of a mile, and when the fort bears W.N.W. anchor in 7 feet water; or, after passing northward and westward of the lighthouse, as given in the directions to cay Biscayne, steer through the northern channel into the bay, and when fort Dallas bears North, steer N. $\frac{1}{2}$ E. $3\frac{3}{4}$ miles, and anchor in 10 feet water.

River Miami.—Virginia cay, northward of cay Biscayne, is about $1\frac{1}{2}$ miles in length, and separated from a long narrow peninsula of the main land by a boat channel called Narrow cut or Boca Rantoes. Abreast the opening is the entrance of the River Miami, with fort Dallas and a small settlement which may be seen in passing.

New River inlet.—From the extremity of the peninsula northward of Virginia cay, the coast of Florida takes a northerly direction for about 17 miles to New river inlet, and is generally formed of low sandy hillocks, scantily clothed with brushwood. For 12 or 15 miles to the northward of cay Biscayne the ground is foul, and the sea breaks heavily, some distance from the shore, but the depth is not less than 3 fathoms.* Should a vessel get ashore in this space, the crew will find, at the distance of every 4 miles, posts on which is an inscription in English, French, and Spanish, pointing out where wells are to be found.

* M. G. de Brahm states that there is not more than 12 feet water at one mile from the shore.

Dry inlet.—At 5 miles northward of New river inlet is the river Seco or Dry inlet, which has a narrow bar of dry sand at its mouth. The shore forms here a little cove, which affords shelter to small craft.

Hilsboro inlet* is 9 miles northward of Dry inlet. All this coast from cay Biscayne is low, and said to be skirted by a coral ledge to the distance of 5 miles; and off New river inlet there is on it as little as 12 feet water. There appears, however, to be moderate depths some way outside the ledge, and attention should be paid to the lead. The Florida stream generally strikes close home to this part of the shore.

Grenville inlet will admit small coasters of 5 feet draught. The entrance may be found by a high mound of sand and rocks called Coopers or Groopers hill. At 6 miles southward of the inlet there is a high ridge of rock, out of which a large stream of water rushes into the sea.

Jupiter inlet.—From Grenville inlet the shore takes a N. by W. direction about 10 miles to Jupiter inlet, which is closed. Near this place are several high black rocks on the beach, and to the north-west of them a hill; and this part of the shore is called by some the Bleach yard, from the numerous white sandy spaces among the bushes. A small reef just covered, about half a mile from the shore, abreast the high rocks, forms a convenient little boat harbour. The colour of the water, which to the southward and in the offing is blue, changes in this neighbourhood to a muddy green. The edge of the bank lies about 11 miles from the land, and the depths are 10 fathoms within about 5 miles of it.

LIGHT.—Northward of the entrance to Jupiter inlet is a lighthouse of red brick, 101 feet high from base to vane. It exhibits, 146 feet above the sea, a *fixed* white light varied by a brilliant *flash* of *seven and a half seconds* duration, every *minute and a half*, visible 19 miles. The flash is preceded and followed by partial eclipses; beyond 12 miles, the light may not be visible during the eclipses.

Gilberts bar.—From Jupiter inlet the shore trends N.N.W. about 12 miles to Gilberts bar, formerly the inlet of the river St. Lucie, but which is now closed. The tide here rises 5 feet, and runs with great velocity.

St. Lucie inlet and shoal.—This inlet, about 5 miles to the northward of Gilberts bar, is closed. The shoal is dangerous, with $2\frac{1}{2}$ fathoms water on it, 5 miles off shore with 6 and 7 fathoms water round it.

† See Admiralty charts :—Sapelo sound to Florida and Providence channels, No. 269, scale, $d=4$ inches; and No. 659, Florida strait, scale, $m=0\cdot16$ inch.

The bottom off this part of the coast is composed of a thin layer of sand over rock; it is therefore dangerous holding ground.

Indian River inlet.—The shore from St. Lucie inlet trends N.N.W. 17 miles to Indian river inlet. The edge of the bank is here 24 miles off shore, but there are two dangerous patches of 15 and 12 feet, $2\frac{1}{2}$ and 8 miles from the coast; the outer and shoalest is in lat. $27^{\circ} 29' \frac{1}{2}$ N., long. $80^{\circ} 10'$ W.

Cape Canaveral.—From Indian river inlet the coast trends N. by W. 60 miles to cape Canaveral. Between them, the shore which is low and fringed with palmetto trees, sweeps in with a slight curve, and becomes extremely dangerous. In lat. $28^{\circ} 3'$ N., about 25 miles to the southward of the cape, there is a shoal nearly dry lying 7 miles off shore.

About 12 miles N.N.E. $\frac{1}{2}$ E. of Canaveral lighthouse is the Hetzel shoal, on which there are only 7 feet water; at $11\frac{1}{2}$ miles N.E. by N. nearly, is the Ohio shoal with 15 feet on it. An automatic signal buoy painted black, and giving blasts of a whistle at short intervals, is moored in 9 fathoms, three-quarters of a mile East of Ohio shoal. At 7 miles N.E. $\frac{1}{2}$ E. is the Bull shoal with 15 feet on it; and $1\frac{1}{2}$ miles North of this shoal there is a small patch on which the sea breaks in strong winds. These shoals are the more dangerous as they are steep-to; in heavy weather the sea breaks on them, but their position is not seen in a smooth sea, and in approaching them a vessel should not come within the depth of 20 fathoms, which will be found about 22 miles from the land. From the Hetzel shoal the lighthouse on cape Canaveral is faintly visible in clear weather from a height of 26 feet; but the land is not in sight.

A shallow bank runs off in a S.E. by E. direction, 5 miles from the cape, and S.E. by E. $\frac{1}{2}$ E. $6\frac{3}{4}$ miles from the lighthouse there is a small shoal with only 11 feet water on it. Between it and the extreme of the bank there is a channel a mile wide, with a depth of 4 fathoms. Vessels of 6 feet draught may bring the lighthouse to bear W.S.W., and steer for it, keeping the south end of a stable in line with the middle of the lighthouse until within 250 yards of the beach, then steer South and pass the cape. The current sets strong to the northward. Vessels seeking shelter under the cape from northerly or westerly winds should bring the lighthouse to bear N.E. and anchor in 15 to 17 feet water, stiff blue mud, at about a third of a mile from the beach. The Florida stream generally sets strong over these shoals, and comes within a short distance of the shore. The edge of the bank here is nearly 30 miles off shore.

LIGHT.—A lighthouse, coloured black and white horizontal bands, stands on the north-east pitch of cape Canaveral. It exhibits, 139 feet above the sea, a white light, which *revolves every minute*, and is visible 18 miles. The old light-tower near it is white.

Currents, Directions.*—In page 433, when directing vessels from the westward to Havana, the great uncertainty of where the Florida or Gulf stream is first encountered was pointed out. Generally it is found not far to the southwest of the Tortugas, on the parallel of about 24° N. There are occasions, however, when it is met with much farther to the south-west and westward, and even to the north-west of those islands. This probably more frequently happens when light south-east and southerly winds prevail in the summer season, or in the winter for a short time after heavy north-westerns, or at periods when the Mississippi is overcharged; but as yet there is no satisfactory data on which a correct judgment may be formed of the interruptions which this great stream meets with, in its exit from the gulf of Mexico through the Florida strait.

The greatest velocity of the stream is naturally in the most contracted part, between the Great Bahama bank and the Florida reefs, but even here there is sometimes no stream whatever to be found for several days; this, however, very seldom happens. Its rate here is generally about 3 knots an hour; but it has been known to rush out though the strait at the rate of 5 knots. Its greatest velocity is experienced in August and September, and the least in February. When first found to the westward it is generally a very narrow stream, but soon spreads out and gains a strength of a knot an hour. Between the Tortugas and Havana it usually occupies the whole strait. Off Havana its force is frequently 3 knots, close to the shore. It is clear therefore that the greatest attention should be paid to the latitude and the longitude by observation.

As before stated, vessels having rounded cape Antonio had better get as quickly as possible on the parallel of lat. 24° N., and work up a short distance on either side of it, until they find the stream. In the winter months, when strong breezes prevail to the northward of East, accompanied by sudden changes to the north-west, they may keep the Florida cays aboard in the daytime, bearing in mind, however, that they are only visible 8 or 9 miles off, and that the Florida reefs are steep-to; so that the moment they are sighted the vessel's head should be placed off shore.† It may also be observed, that within this distance from the west end of the reefs to the Carysfort elbow, there is generally no current, and frequently a strong eddy to the south-west.

After passing Elbow cay lighthouse on cay Sal bank, it will be advisable to keep the Bahama side aboard, and, if possible, without sacrificing too much time, to take a departure from the lighthouse. From abreast Gun

* See Admiralty charts, No. 1,217, West Indies, sheet 1, Florida strait; and No. 659, Florida strait.

† The mariner is reminded that, during the day, the American flag is displayed above the lantern, at Sand cay, Sombrero, and Carysfort lighthouses.

cay light, a track in mid-channel will be better, in order to avoid the dangers on the Little Bahama bank. Should a vessel be caught with a Norther in this part of the strait, she will be exposed to a heavy short sea, and as the stream runs at this time with perhaps increased force she had better make short boards under easy but commanding sail, bearing in mind that the wind will shortly veer round to the north-west, making the Florida side a most dangerous lee shore.

In the summer months, when the winds prevail to the southward of East, a vessel may probably get through without having to make a board, making use of the remarkable hills on Cuba to check the reckoning. Extreme care must, however, be taken to give the Colorados,—page 419—a very wide berth. Even in this case it will be as well to sight Elbow cay light. It need scarcely be said that vessels bound to the north-east, instead of attempting to haul close round Matanilla reefs—page 547—will find it more safe and advantageous to keep in the stream, until they are fully assured of being far to the northward of this dangerous spot.

Directions for navigating from East to West have been given in pages 537 and 542.

CHAPTER XII

THE BERMUDA ISLANDS.

 VARIATION IN 1887.

 Bermuda islands, $7^{\circ} 45' W.$

THE BERMUDA OR SOMERS ISLANDS.

This group* is said to have been discovered by Juan Bermudez, a Spaniard, in 1527. The earliest account is by Henry May, who was wrecked on them in 1593. Sir George Somers shared the same fate in 1609—hence their name. They were first settled by the English under a charter from King James in 1612, and have remained in their possession ever since. The number of islands, great and small, may exceed 100; but the principal ones, which are inhabited, are St. George, St. David, Hamilton, Somerset, and Ireland. The population in 1884 (according to latest census) was 14,314, in which year the exports amounted to 92,415*l.*, and the imports to 320,141. The principal trade is with the United States. In the same year 184 vessels entered the port of 122,201 tons. The rate of wages is very high. Supplies are plentiful, but expensive. Coals can be obtained by merchant vessels from a hulk moored near St. George's. There is a patent slip at St. George's capable of taking up a vessel of 1,200 tons. There are very stringent quarantine regulations in force, a copy of which is delivered on board every ship arriving by the pilot who boards her.

Being situated between the parallels of 32° and $33^{\circ} N.$, about an equal distance from the West India islands and British North America, the climate is a mean between the two, partaking neither of the extreme heat of the one, nor of the excessive cold of the other. Owing to the Gulf stream, which passes between the Bermudas and the American continent, the climate is greatly ameliorated, the winter months resembling the early part of October in England, but without its frost; gardening is pursued

* See Admiralty charts :—Bermuda islands, No. 360, scale, $m = 0.7$ inches, with plans, and No. 867. The Narrows to Ireland island, scale, $m = 1.4$ inches.

during this part of the year, while the tropical productions of the West Indies are cultivated during the heat of the summer.

The winter or cold season is the most agreeable, and lasts from November to March. In the latter part of February spring commences, and the weather usually continues mild, with refreshing showers and gentle breezes from south and west, until the end of May. In June the summer sets in, and the weather becomes hot. Calms now succeed to the gentle breezes of May; the air is sultry and oppressive, and long droughts are common, which are often broken up by heavy thunderstorms. In September the weather changes its character, and becomes again mild and agreeable. Hurricanes and tempests are frequent, and few autumns pass without them, of more or less violence; the squalls are heavy and sudden, occurring particularly in the winter season.

The whole of these islands lie on the south-east side of an oval-shaped coral reef, nearly dry at its edges, 21 miles in length north-east and south-west, and from 6 to 11 miles in breadth. They are composed of sand and limestone more or less compact, and clothed principally by cedar trees, of sufficient size for the scantling of boats and vessels as large as 250 tons. They are irregularly hilly, and the valleys contain a rich vegetable soil, capable of producing abundant crops of arrowroot, potatoes, and other vegetables, which are largely exported; as is also a small quantity of straw plait and tropical fruits. The inhabitants have to depend almost entirely on rain water caught in stone tanks, which are attached to the houses for this purpose. There are a few wells, but they are only resorted to in a case of necessity.

St. George, the north-eastern island of the group, is nearly 3 miles in length in a north-east and south-west direction, and a little more than half a mile across at the broadest part; in the centre, however, it is nearly cut in two by a shallow bight. On the south side of the northern part the land forms an elbow, and here there is a considerable town, formerly the seat of government, and in front of it a secure harbour, protected by St. David and other islands, for vessels of 14 or 16 feet draught, which can cross the bar at high water.

On the bluff of St. Catherine point, the north-east extreme of St. George and of the whole group, fort St. Catherine stands conspicuous from its isolated appearance, a narrow strip connecting it to the higher land at the back, which is steep, and moderately wooded on its northern side, fort Victoria crowning the summit, about 150 feet above the sea. To the south-west of the latter is fort St. George, 164 feet above the sea, distinguished by its flagstaff and yard, and here a signal is made of every vessel approaching the island.

Sugar-loaf or Cherry-stone hill is 108 feet high, conical, and rises on the north-west side of St. George island; it is steep and abrupt on its north-east side, and is the highest peak seen southward of fort George.

On the south-east point of St. George island stands all that remains of the Old fort or Town cut battery; it is a square stone ruin, hardly visible at any distance from seaward, and lies about midway between St. David head and St. Catherine point. Close to the south-east of the fort is a small rocky islet, called Higgs island, dividing the passage between St. George and Paget islands into two boat channels, the northern of which is called Town cut.

Paget island.—About half a mile N.W. $\frac{1}{2}$ W. from St. David head on the first bare patch of moderately high land (about 73 feet), is fort Cunningham on the south-east part of Paget island, which is nearly a third of a mile in length.

St. David island is about 2 miles in length, east and west, but its shores are very irregular. Its east end terminates in a bold rocky promontory between 70 and 80 feet high, thickly covered with cedar pine, called St. David head, which forms the eastern extreme of the group.

LIGHT.—A lighthouse 55 feet high, white and octagonal in shape, stands on Mount hill, about one-third of a mile south-west of St. David head, from which at an elevation of 208 feet above the sea is exhibited a fixed white light, visible seaward of the north-east part of Bermuda through an arc of 270 between the bearings of N. 52 E. and S. 38 E. (it is interrupted by the land about fort Victoria on a S. 34 E. bearing), it should be seen in clear weather 20 miles. Lieut. Belam, H.M.S. *Argus*, in 1877, observes that the tower of this lighthouse was seen from the mast head 25 miles distant; it shows well above the trees, and is the first object seen when making the land from the north-eastward.

Hamilton, Long, or Bermuda island, the largest of the group, is about 13 miles in length, and near the middle $1\frac{1}{2}$ in breadth; its shores, however, are very irregular, and so is its surface. The highest part, called Gibbs hill, near the south-west end of the island, is 256 feet high.

The town of Hamilton stands near the centre of the island, on the north side of Hamilton or Crow Lane harbour, and is the seat of government. The harbour is convenient, well-sheltered, and capable of receiving vessels of 10 or 12 feet draught alongside the wharf in front of the town.

LIGHT.—A white circular iron lighthouse stands on the round barren rocky summit of Gibbs hill, which exhibits, 362 feet above the sea, a *revolving* white light, attaining its greatest brilliancy every *minute*, and seen in clear weather about 24 miles. The light is intercepted by some hills to the north-east of it between the bearings of S. 50° W. and S. 54° W. also between S. 55° W. and S. 64° W.

In steering for Bermuda at night or in thick weather it is advisable not to go to the northward of the parallel of $32^{\circ} 8'$. In coming from the south-east, Gibbs hill light should not be brought to the southward of W. by S., or during the night approached nearer than 6 or 7 miles. Coming from the westward, it should be kept at the distance of 10 or 12 miles, until it bears northward of N.E. by E. A vessel from the northward sighting this light should haul off immediately, as the reefs extend off in that direction 16 miles, but the light on St. David head will be a sure guide.

Somerset island is about 2 miles long north and south, a quarter to a mile broad, and generally not so elevated as the others.

Ireland island, the north-western island, is nearly $1\frac{1}{2}$ miles long north-east and south-west, about a quarter of a mile broad, and is entirely occupied by the Government establishments.

Dock.—The iron floating dock is 381 feet long over all, and 330 feet long inside; the breadth of entrance is 83 feet 9 inches; to take a ship drawing 25 feet, the dock requires to be in at least 50 feet water.

Time Signal.—A time ball is dropped from a flagstaff at the Dockyard, Ireland island, at noon local mean time (Saturdays only), corresponding to 4h. 19m. 18·3s. mean time at Greenwich.

Grassy bay the man of war anchorage lies on the east side of Ireland island, northward of the flats connecting that island with Spanish point. It affords good anchorage for a number of vessels in from 7 to 8 fathoms, marl bottom; in heavy northerly gales vessels should have a good scope of cable, when there will be little danger of dragging. There are four sets of moorings in the bay.

The reef.—The south-east side of the remarkable reef,—from which the Bermudas rise,—from St. David head to the lighthouse, is bounded by the islands which lie in most parts within a quarter of a mile of the edge with the 100-fathom line about a mile beyond it; the depth of 10 fathoms being almost alongside the reef. Nearly abreast Gibbs hill lighthouse the reef extends a mile from the shore, and thence it takes a westerly direction for about 8 miles, and the outer detached parts are called the South-west breaker, Chaddock, Little, and Long bars. It then sweeps round to the north and north-east, passing about 6 miles from Somerset island, continuing with an outward curve to North rock.

North rock.—This little rock shows as three sharp pinnacles, 8 feet above high water, at low water these three pinnacles are seen to be connected by a common base, in the shape of an irregular oblong rock,

flat on top, intersected by narrow cuts with from 1 to 5 feet of water in them. It lies on the very edge of the reef, and from it the lighthouse on Gibbs hill bears S.S.W. $13\frac{3}{4}$ miles; the north-east part of Ireland island S.S.W. $\frac{1}{4}$ W. $9\frac{1}{4}$ miles; and St. Catherine point, the north extreme of St. George, S.E. $\frac{3}{4}$ S. nearly 7 miles.

From this rock the reef trends about E. by N. and East for nearly 5 miles, passing $5\frac{1}{2}$ miles northward of St. Catherine point, when it sweeps round to the south-east and south, and terminates half a mile from St. David head. There are several narrow openings through this great barrier, leading into secure anchorages, but only one navigable for ships of large draught.

Mills breaker, N.N.E. $\frac{1}{2}$ E. $2\frac{3}{4}$ miles from St. David head, and E. by N. $\frac{3}{4}$ N. about $2\frac{1}{2}$ miles from St. Catherine point, is on the eastern edge of the reef, and dries at low water. A buoy has been placed near Mills breaker, N.N.E. $\frac{3}{4}$ E., $2\frac{3}{4}$ miles from St. David head.

Soundings of from 10 to 15 fathoms extend seaward for over three miles from this part of the reef, and to the southward of Mills breaker the edge of the bank gradually approaches the shore to about a mile off at Gurnet rock. A patch (named Ariadne) of $11\frac{1}{2}$ fathoms, on the edge of the bank, lies E. by N. $4\frac{1}{2}$ miles from Mills breaker.

FIVE FATHOMS HOLE ANCHORAGE, sometimes called Jervis roadstead, is open to all winds from W.N.W. round by north to S.S.W., with no protection from the sea except what the reefs afford, and that only from the former bearing to N.N.E. It may therefore be considered nothing more than a stopping place for a pilot. In favourable weather, with the wind from N.W., a vessel may anchor in from 7 to 9 fathoms water, with St. Catherine point bearing N.W. by W. $\frac{1}{2}$ W., and the Sugar-loaf, (Cherry-stone hill) seen through the Town cut W. $\frac{1}{4}$ N., but care should be taken to select a clear sandy spot, for the darker ones, which may generally be detected from aloft, especially on a bright sunny day, are rocky coral heads, and by anchoring on them the loss of the anchor is risked. The mariner should be prepared to quit the moment the winds begin to veer.*

* Sir William Read observes, in his valuable work on Storms and Variable Winds, that when a northerly or north-west gale, with a *rising* barometer, has quickly followed a southerly gale and *falling* barometer, ships may be anchored with confidence on the south side of Hamilton island, in clear places known to the pilots, until the northerly gale moderates. They should then weigh and stand to the eastward in readiness to enter the main channel, because the next gale which follows may be expected to set in from the east or south-east.

Leading Mark.—The Sugar-loaf seen through the Town cut bearing W. $\frac{1}{4}$ N. leads in from seaward clear of all dangers to 5 fathoms hole anchorage, whence vessels may enter the Narrows or St. Georges harbour.

THE NARROWS OR SHIP CHANNEL is at the east end of the group abreast St. George island, where the reef is broken up into detached masses, and is entered from 5 fathoms hole. It is, however, so narrow that without a leading wind, and the assistance of the buoys which point it out, it would be impassable, even with the help of the pilots, who are guided mostly by the eye; no marks are available, and it would be useless to attempt to give directions. With the buoys in position, and with local knowledge the difficulty in navigating this channel is much reduced.

The water is deep, and there are from 6 to 9 fathoms, until near the last four buoys of the channel, northward of St. Catherine point, where there are some few small shallow patches with 24 feet on them at the lowest tide, and 5 or 6 feet greater depth close to them. After crossing the line of the two flagstaffs, Victoria and St. Catherine, a vessel will be clear of the shoalest part; and about midway between the two north-west buoys of the channel the least depth will be $4\frac{1}{2}$ fathoms.

Buoys.—The entrance to the Narrows is between two buoys. That on the north-east side is a large chequered *black* and *white* buoy in 26 feet water, on a coral patch, with the centre of fort Cunningham bearing S.W. $\frac{3}{4}$ W., and St. David head south. On the south-west side is the outer fairway buoy, *black* with staff and globe, S.E. by S., nearly 3 cables from the north-east buoy, with fort Cunningham W. $\frac{3}{4}$ S., and St. David head S. by W. $\frac{3}{4}$ W. Between these buoys there is as much as $6\frac{1}{2}$ fathoms water over sandy bottom, but there are coral patches with less water.

The channel runs nearly N.W. and S.E., and is well marked with chequered *black* and *white* buoys on the north-east side, and *black* on the south-west. The outer black buoy, called by the pilots the bar buoy, has a staff and globe on it. Within the buoy the ground is foul, interspersed with clear sandy patches, but no anchorage for vessels of any burthen.

Inside the Narrows and in the north part of Murray anchorage is a *red* nun buoy, with "Fairway" painted on it, in $9\frac{1}{2}$ fathoms water, with St. David head open of St. Catherine valley S.E. $\frac{1}{2}$ S., and Prospect hill barrack well open of Crawl point S.W. $\frac{1}{2}$ S. This buoy is a guide when opening the channel leading through the Narrows, and should be kept well on the port hand by vessels proceeding to sea.

Pilots.—The first-class pilots are experienced men, but in piloting a long and heavy ship through the Narrows, familiarity with the capabilities

of the ship, as well as great judgment and nerve, are necessary; as it is possible also that shallow heads may exist similar to that on which H.M.S. *Ariadne* touched in 1872, with 22 feet water on it (since deepened to 24 feet by blasting), caution is necessary. The general rule with the pilots, who are always to be obtained, is to give the chequered buoys the closer berth.

Directions.—Coming from the northward, St. David head bearing S.W. by W. will lead eastward of all the shoals. From the southward, St. David head may be safely rounded at the distance of a mile; and when it bears S. by W. $\frac{3}{4}$ W., and St. Catherine outer bastion N.W. by W., a vessel will be in a good position for Ship channel or the bar of St. George harbour. Sugar-loaf or Cherry-stone hill seen through the Town cut, bearing W. $\frac{1}{4}$ N. is also a good leading mark from seaward, but the cut, at times is somewhat difficult to distinguish.

ST. GEORGE CHANNEL AND HARBOUR.—On the northern part of St. David island, and less than half-way to the head, are the leading marks for passing over the bar into St. George harbour. The northern one is a tall stake painted *white*; the southern a broad stone pillar painted *white*, also with a *black* stripe down its middle and sea face, and standing S.S.W. westerly, about 380 feet from the stake.

Half-way between these marks and fort Cunningham is the entrance to the harbour. A small rocky islet, called Governor island, lies nearly in the centre of the channel, and on its south-east part stands a *white* stake, one of the marks for the Manhattan shoal; and about 150 yards S.W. by W. $\frac{1}{8}$ W. from it, on the eastern part of Smith island, is the inner stake. The Manhattan shoal is close to the entrance of the harbour, and a *black* pole is moored on it in 14 feet water, rocky bottom.

The bar channel is marked by *white* nun buoys and poles on the western side, and *black* nun buoys on the eastern. From the Five fathoms hole with the pillar and stake in line, bearing S.S.W. westerly, the least depth carried in is 18 feet. After passing the first four buoys, a *white* pole will be seen on the Elbow, which leave to the westward. When the marks for the Manhattan shoal are on, keep them so until nearly up to the *black* pole, leaving it on the port hand or to the southward, and then steer in with Whale house, a low white building on the north-east part of Smith island, and the only building seen, well open of Paget island, passing in mid-channel, northward of Governor island; thence the best channel is rather nearer the north shore, avoiding the shoals extending north-westward of Paget island. From 14 to 16 feet at low water will be found on the bar connecting Ordnance and Hen island, westward of which there is

good and secure anchorage in St. George's harbour is from 5 to 7 fathoms, stiff clay, perfectly landlocked.

Boiler channel.—This channel is south-eastward of St. George channel, and along by the shore of St. David island, and is used when the weather is moderate and the wind scant through St. George channel. The entrance is between two poles distant about a quarter of a mile from the shore. The *black* or eastern one is in $9\frac{1}{2}$ feet with the centre of fort Cunningham W. $\frac{3}{8}$ N., and the rock under St. David head S.S.W. westerly. The *white* or western pole is in 14 feet with fort Cunningham W. $\frac{1}{2}$ N., and the rock under St. David head S. by W. $\frac{3}{4}$ W. westerly. This channel is very narrow and only available for vessels of less than 10 feet draught, and in charge of a pilot. The leading mark through is Whale house, showing over the south-east part of Paget island bearing West, and the least water, (avoiding patches), is 15 feet.

CASTLE HARBOUR.—The next opening lies about 2 miles to the south-west of St. David head, leading into Castle harbour, a circular basin of about 2 miles in diameter, with, in places, as much as 6 fathoms water, but it is filled with shallows. The channel into it has a depth of 18 feet, but it is never used for commercial purposes.

CUTS.—**Hog Fish cut** is at the south-west end of Hamilton islands, about 2 miles westward of the lighthouse, through which small island vessels thread their way by the eye into Elies harbour. This snug little basin is formed between the ends of Hamilton and Somerset islands. On the north-west part of the former there is a small conical hill about 150 feet high, called Wreck hill, which is very conspicuous, and a useful object in approaching from the north or south.

Chub and Blue cuts.—On the north-west side of the reef there are three more openings called the Chub and Blue cuts, through which small traders find their way into Grassy bay and Hamilton harbour, passing close along the north-west side of Ireland island, but no directions can be given for them.

North Rock cuts.—There are also two more openings, one on either side of North rock, capable of being navigated by vessels of large draught, provided they are previously buoyed, and the wind and weather favourable.

Tides.—It is high water, full and change, about 7h. 14m. both at St. George and Ireland islands; the rise at springs is about 4 feet, but it is uncertain. At neaps the rise sometimes is not more than one foot. Northerly winds cause the highest and south-westerly the lowest tides; the force of the stream is also variable, and probably affected by the current prevailing outside.

The flood from the eastward round St. David head sets into St. George harbour and through the Narrows nearly in the direction of the channel, to off St. Catherine point, where it sweeps round to about W.S.W., and sets a quarter of a knot to 2 knots an hour according to the force of the wind. The ebb runs with the same force from the south-west towards St. Catherine point, where it diverges to the E.S.E., trending more southerly eastward; off St. George it is strengthened by the stream through the ferry and harbour to seaward. About the Sea Venture shoals on the north side of the Narrows it sets in all directions, and stronger about the buoys near these shoals, which is the narrowest part of the channel.

The following, in connexion with Bermuda islands and their off-lying banks of shoal ground, has been drawn up from the reports of Commander R. H. Harris, H.M.S. *Argus*, and Commander W. H. Hall, H.M.S. *Flamingo*; these officers, under Admiralty instructions, having conducted the sounding operations of July 1879.*

North-west of the Islands.—A depth of 60 fathoms has been reported to exist in lat. $32^{\circ} 40' N.$, long. $65^{\circ} 32' W.$ or N.W. 42 miles from Gibbs Hill lighthouse. In examining this locality 2,520 fathoms was obtained by the *Argus*, N.W. $\frac{1}{2}$ N. 5 miles, and another sounding of 2,560 fathoms, E.S.E. 8 miles from the reported position. The *Argus* passed over the assigned position, sounding with 60 fathoms of line, no bottom.

Local pilots and fishermen have assumed the existence of a shoal fishing bank which they supposed to lie 15 to 20 miles to the north-west of the islands. To test these statements, the *Flamingo*, having embarked two of the fishermen, proceeded to the reported locality. But the position indicated by these men was found to be just inside the 100-fathoms line of soundings, or about 2 cables outside the edge of the encircling reef, a mistake having been made by them in estimating the distance from the shore by eye.

(2.) **South-west of the Islands.**—In June 1829 H.M.S. *Columbine* anchored in 35 fathoms on a coral bank, S.W. by W. $24\frac{1}{2}$ miles from Gibb's Hill lighthouse. Depths of 28 to 38 fathoms in the neighbourhood of the *Columbine's* anchorage were subsequently obtained by H.M.S. *Larne* in April 1836.

The soundings obtained by the *Columbine* and *Larne* have recently pointed to a possible extension southward and westward of the bank which

* See Admiralty charts :—North Atlantic ocean, general, No. 2,059 ; Western part No. 2,060 ; Bermuda islands, No. 360.

was sounded over by H.M.S. *Challenger* in May 1873. The examination now made by the *Argus*, although not proving that the two banks are joined, has shown that Challenger bank extends about 2 miles farther south, and has brought to knowledge the existence of a bank of coral lying 7 miles to the south-west of Challenger bank. On obtaining soundings, the *Argus* anchored in 30 fathoms, coral, S. 46° W. 24 miles from Gibb's Hill lighthouse.

This bank, now named Argus bank, is 6 miles in extent, east and west (between the 100-fathoms line of soundings), and $5\frac{1}{2}$ miles north and south. The least water obtained was 10 fathoms, on a spot covering a small area, bottom reddish brown coral, situated S. 49° W., 26 miles from Gibb's Hill lighthouse. Several casts of 20 fathoms were obtained, but the general depth is 30 fathoms, the bottom chiefly composed of coral with occasional rock and sand patches. It is probable that in bad weather the sea would break on the 10-fathoms patch.

Argus bank abounds in fish; snappers and large rockfish were caught plentifully.

The surface currents during the sounding operations of the *Argus* were found to be weak and irregular. On Argus bank on one occasion the current set to the S.E. at the rate of three-quarters of a mile an hour.

Bank of soundings outside encircling Reef.—With the object of determining the distance to which the 100-fathoms line of soundings extends from the northern and western edges of the encircling reefs, an examination was made by Commander Hall. The soundings outside the reefs gradually deepen from 7 to 8 fathoms to 30 and 35 fathoms, and then suddenly to no bottom with 100-fathoms line. Thus on the east side the 100-fathoms line is found at 3 miles distant from the reef, on the south side $1\frac{1}{2}$ miles, on the south-west extremity about 5 miles, and on the north and west sides 2 to 3 miles.

Current.—The Bermuda islands are about 240 miles to the southward and 400 to the eastward of the outer limits of the Gulf stream. Hence the current in the neighbourhood is exceedingly variable, both in force and direction. Generally, however, it appears to be greatly influenced by the wind, particularly if it has blown from the same point for several days, when its velocity may be found to be a knot an hour, or more, in the opposite direction. The utmost attention to the reckoning is therefore requisite, and should the vessel's position be at all doubtful, and the weather unfavourable for seeing the lights, the parallel should not be crossed in the night time, for the edge of the bank is too close to the reef for soundings to give safe warning.

RAINFALL and TEMPERATURES of the SEA and AIR at BERMUDA.

Month.	Temperature of Air.			Temp. of Sea.	Rain-fall.	Month.	Temperature of Air.			Temp. of Sea.	Rain-fall.
	Mean.	Highest.	Lowest.				Mean.	Highest.	Lowest.		
	°	°	°	°	ins.		°	°	°	°	ins.
January	63	78	41	62°00	4'19	July -	79	98	64	79°50	3'8
February	62	77	44	63°00	4'35	August -	79	98	65	82°50	3'9
March -	62	76	39	—	3'74	Sept. -	78	97	59	80°75	5'2
April -	65	80	44	65°00	3'71	October	74	90	53	76°75	6'94
May -	70	87	52	70°50	4'31	Nov. -	68	81	50	65°00	6'92
June -	75	92	56	77°25	3'03	Dec. -	64	78	45	62°00	4'57

Winds.*—The Bermuda islands appear to lie near the northern limit of the variable winds, and also on the track of hurricanes, and revolving storms passing off and along the shore of America, which is distant about 600 miles. The revolving winds which pass over the islands vary in strength from breezes to storms. In the summer season the winds are light and usually steady for a considerable time, blowing in straight lines or on one point, with but little fluctuation in the barometer. But after the commencement of November, veering winds, of various degrees of force, set in and gradually become frequent, yet they seldom follow in such rapid succession as that one gale becomes confounded with another. Light winds and very fine weather usually intervene between the passage of revolving winds; while, at other times, hard blowing straight line winds with a high barometer are experienced.

The arrival of such succeeding progressive rotary winds is indicated by the barometer falling, as well as by the increase of the wind's force, which will often occur suddenly. Except in the case of great storms, perfect regularity in the fall and rise of the barometer, and in the changes of the wind, will not be found; for the direction of the wind, as well as the atmospheric pressure, is, no doubt, modified by other revolving gales or strong winds blowing at the same time, but when whirlwinds, tempests, or hurricanes blow, they overpower such irregularities.

In the winter season northerly winds sometimes blow hard without veering, for two and three days together. The air is then dry and cold, and whilst the thermometer falls, the barometer remains stationary, or rises a little. Misty weather is very uncommon, but it constantly happens that a change of weather is first announced by increase of both temperature and moisture in the air. The December gales generally commence from the south, veer round by the west, and terminate at about N.W. or N.N.W.

* The observations which follow are extracted chiefly from Sir William Reid's work on storms and variable winds.

Directions.—During the winter months most of the gales which pass along the coast of North America are revolving. Vessels from Bermuda, bound to that shore, should therefore put to sea when the north-west wind, which is the conclusion of a passing gale, is becoming moderate, and the barometer is rising to its usual level. The probability is, more particularly in the winter season, that after a short calm the next succeeding wind will be easterly, the first part of a fresh revolving wind coming up from the south-west quarter.

A ship bound to New York or the Chesapeake might sail whilst the wind is still West and blowing hard, provided the barometer indicates that this west wind is owing to a revolving gale which will veer to the northward. But as the usual track which gales follow in this hemisphere is northerly, or north-easterly, such a ship should be steered to the southward. As the wind at West veers towards north-west and north, the vessel would come up, and at last make a westerly course, ready to take advantage of the east wind at the setting in of the next revolving gale.

A vessel at New York and bound to Bermuda, at the time when a revolving gale is passing along the American coast, should not wait in port for the westerly wind, but sail as soon as the first portion of the gale has passed by and the north-east wind is veering towards the north, provided it should not blow too hard. For the north wind will veer to the westward, and become every hour fairer for the voyage to Bermuda. A great number of gales pass along the coast of America, following nearly similar tracks, and in the winter make the voyage between Bermuda and Halifax very boisterous. These gales, by revolving as extended whirlwinds, give a northerly wind along the American continent, and a southerly wind on the whirlwind's opposite side far out in the Atlantic. In sailing from Halifax to Bermuda it is desirable for this reason to keep to the westward, as affording a better chance of having a wind blowing at North instead of one at South, as well as because the Gulf stream sets vessels to the eastward.

When vessels from Barbados or its neighbouring West Indian islands sail to Bermuda on a direct course, they sometimes fall to the eastward of it, and find it very difficult to make when westerly winds prevail. They should therefore take advantage of the trade wind to make the 68° or 70° of longitude before they leave the parallel of 25° N.

TABLE OF POSITIONS

OF THE

ISLANDS IN THE CARIBBEAN SEA, WITH THE BAHAMA AND
BERMUDA ISLANDS AND FLORIDA STRAIT.*

Place.	Particular spot.	Latitude, North.	Longitude, West.
Windward or Caribbean Islands.			
Barbados, Bridge Town,	Flagstaff of Rickert's battery	13 05 42	59 37 18
Carlisle bay			
Grenada, St. George harbour	Fort George, flag-staff -	12 3 2	61 44 55
Carriacou -	Pilot point -	12 26 5	61 25 18
St. Vincent, Kingston -	Police yard, Treasury -	13 9 4	61 13 15
St. Lucia, port Castries -	Tapion battery -	14 1 30	61 0 50
Martinique -	Fort St. Louis -	14 36 7	61 4 15
" St. Pierre -	St. Marthe battery -	14 43 54	61 11 12
Aves island -	Centre -	15 42 0	63 37 46
Dominica, Roseau -	Fort Young flag-staff -	15 17 27	61 23 5
Guadaloupe -	Vieux fort point -	15 57 0	61 42 0
Saintes -	West point -	15 50 55	61 38 35
Deseada -	North point -	16 20 55	61 0 8
Antigua -	Man-of-war point -	17 3 22	61 39 44
" English harbour -	Dockyard flag-staff -	17 0 0	61 45 18
" St. John -	North tower of the Cathedral	None determined.	61 50 28
Barbuda -	Martello tower flag-staff -	17 35 50	61 49 36
Montserrat -	Plymouth wharf -	16 42 12	62 13 0
Redondo -	Centre -	16 55 18	62 18 53
Nevis, Charlestown -	Fort Charles -	17 7 52	62 37 10
St. Christopher -	Basseterre church -	17 18 12	62 42 55
St. Eustatius -	Fort flag-staff -	17 29 10	62 58 50
Saba -	Diamond rock -	17 39 10	63 14 57
St. Bartholomew -	Fort Oscar -	17 53 58	62 51 6
St. Martin -	Fort Marigot -	18 4 7	63 5 21
Anguilla -	Custom house -	18 13 6	63 4 15
Sombrero -	Lighthouse -	18 35 37	63 27 48
Virgin Islands and Puerto Rico.			
Anegada -	East extreme of reefs -	18 36 30	64 10 34
Tortola -	Fort Burt -	18 25 4	64 36 35
St. John -	Ram head -	18 18 8	64 41 51

* For list of Secondary Meridians in the West Indies, see Supplement 1885 to General Instructions for Hydrographic Surveyors.

Place.	Particular spot.	Latitude, North.	Longitude, West.
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Virgin Islands and Puerto Rico—continued.

		° / "	° / "
Santa Cruz (St. Croix)	Langs observatory Corner of Transit Pier.	17 44 43	64 41 17
St. Thomas	Fort Christian	18 20 23	64 55 52
Culebra or Passage island	Soldier point	18 16 46	65 17 7
Bieques or Crab island	East point	18 8 15	65 16 6
Puerto Rico	San Juan head lighthouse	18 23 0	65 37 0
" Port San Juan	Lighthouse on Morro fort	18 28 56	66 7 28
Mona island	West point	18 5 25	67 57 36
Desecheo islet	South point	18 22 42	67 29 10

Haiti or San Domingo.

St. Domingo, city	Consulate	18 28 12	69 52 0
Alta Vela	Summit 500 feet	17 28 50	71 39 44
Beata Island	North-west point	17 36 45	71 32 54
Jacmel	Wharf	18 13 30	72 33 39
Isle Vache	Sandy beach near North-west point.	18 6 0	73 43 40
Cape Dame Marie	West extreme	18 36 30	74 27 13
Jeremie	Fort	18 38 15	74 5 54
Grand Cayemites	South-west point	18 36 0	73 48 59
Rochelois	Dry rocks	18 38 30	73 12 24
Merigoane	Fort	18 27 0	73 4 38
Petit Goave	Island in the bay	18 26 15	72 51 30
Gonave island	West point	18 55 26	73 18 34
Port au Prince	Fort Alexander	18 33 10	72 19 56
"	Dr. Williamson's house, near fort Bizozhen.	18 32 10	72 22 44
North Arcadin	Centre	18 48 0	72 38 4
Gonaïves	Verrier point	19 25 42	72 42 52
Nicolas mole	Fort George	19 49 30	73 22 34
Port au Paix	Wharf	19 57 40	72 48 54
Cape Haiti harbour	Town fountain	19 46 40	72 10 42
Point Granja	West point	19 54 45	71 39 3
Isabelle bay	Hut in bight	19 53 50	71 4 7
Port Plata	Fort	19 48 34	70 42 6
Town of Samaná	"	19 12 30	69 19 50
Bay of Samaná	Carenero Grande cay	19 11 30	69 19 47

Jamaica, with cays and banks adjacent.

Navassa is. and	North extreme	18 25 10	75 2 3
Morant cays	South-east cay	17 23 20	75 59 40
Mormigas bank	Shoal spot	18 33 0	75 44 24
Morant point	Lighthouse	17 55 5	76 11 40
Yallahs point	West extreme	17 51 30	76 33 34
Port Royal	Fort Charles	17 55 56	76 50 38
Pedro bluff	Cove, a quarter of a mile to the northward.	17 51 30	77 45 24
Savannah-la-mer	Fort	18 12 20	78 8 54
Negril bay	Wharf in south part	18 16 50	78 22 24
St. Lucia	Fort	18 27 45	78 11 24

Place.	Particular spot.	Latitude, North.	Longitude, West.
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Jamaica, with cays and banks adjacent—continued.

		° / "	° / "
Montego bay - - -	Fort - - -	18 29 25	77 56 48
Falmouth - - -	" - - -	18 30 34	77 40 24
St. Anne bay - - -	Long wharf - - -	18 26 24	77 13 24
Port Maria - - -	North-west wharf - - -	18 23 0	76 54 54
Port Antonio - - -	Fort flag-staff - - -	18 11 15	76 27 24
Baxo Nuevo - - -	Sandy cay - - -	15 53 0	78 39 4
Grand Cayman - - -	Fort George, west end - - -	19 17 45	81 23 54
Little Cayman - - -	West point - - -	19 39 10	80 7 54
Cayman Brac - - -	South-west point - - -	19 40 35	79 54 59
" - - -	North-east point - - -	19 44 30	79 43 53
Pickle bank - - -	Centre - - -	20 23 20	80 29 50

Cuba.

Capé Mayas - - -	Lighthouse - - -	20 15 10	74 10 24
Port Guantanamo - - -	East head - - -	19 55 0	75 16 0
Santiago de Cuba - - -	Blanca battery, South angle - - -	20 00 16	75 50 30
Cape Cruz - - -	Lighthouse - - -	19 50 0	77 44 30
Caballones channel - - -	Pilot point - - -	20 46 30	78 58 30
Boca Grande cay - - -	West point - - -	21 0 0	79 19 0
River Guaurabo - - -	Ciriales point - - -	21 46 0	80 2 0
Port Xagua or Jagua - - -	Lighthouse - - -	22 1 0	80 30 0
Xagua bank - - -	Shoal part - - -	21 37 0	80 35 0
Piedras cay - - -	Lighthouse - - -	21 58 0	81 3 0
Jardines bank - - -	East point - - -	21 39 0	81 2 0
Rosario channel - - -	South entrance - - -	21 37 0	81 55 0
Isle of Pines - - -	Frances point - - -	21 37 15	83 12 34
" - - -	Extreme south point - - -	21 21 24	82 56 0
Bahia Honda - - -	Point Cerro del Morrillo - - -	22 58 49	83 12 0
Havana - - -	Morro lighthouse - - -	23 9 21	82 21 30
Peak of Matanzas - - -	Summit - - -	23 1 54	81 45 0
Paredon Grande cay - - -	Lighthouse - - -	22 29 3	78 9 53
Cay Verde - - -	North-west end - - -	22 8 45	77 38 15
Maternillos point - - -	Lighthouse - - -	21 40 6	77 8 57
Port Naranjo - - -	East side of entrance - - -	21 7 30	75 53 0
Peak of Sama - - -	Summit (885 feet) - - -	21 7 0	75 48 22
Lucrecia point - - -	Lighthouse - - -	21 4 38	75 37 55
Port Baracoa - - -	" - - -	20 21 0	74 28 30

Bahama Islands and Banks.

Navidad bank - - -	Centre of east side - - -	20 2 0	68 47 24
Silver bank - - -	East extreme - - -	20 35 0	69 21 24
Mouchoir bank - - -	North-east breaker - - -	21 6 30	70 29 54
Grand Turk - - -	Hawk's nest - - -	21 26 15	71 7 30
South Caicos - - -	Parsons point - - -	21 29 33	71 31 30
French cay - - -	West point - - -	21 30 0	72 12 51
West Caicos - - -	Hill, south-east end - - -	21 37 30	72 28 33
Port George cay - - -	Old magazine - - -	21 54 0	72 7 14
Inagua island - - -	South side, Lantern head - - -	20 56 40	73 19 24
" Alfred sound - - -	North-west point - - -	21 7 10	73 40 21
" Mathew road - - -	Henrietta fort - - -	20 57 0	73 41 0

P P 2

Place.	Particular spot.	Latitude, North.	Longitude, West.
Bahama Islands and Banks—continued.			
		° ' "	° ' "
Little Inagua - - -	North-west point - - -	21 30 40	73 2 33
Hogsty reef - - -	North-west cay - - -	21 40 30	73 51 3
Mariguana - - -	South-east point - - -	22 16 30	72 47 3
" - - -	North-west point - - -	22 27 40	73 7 33
Plana or Flat cay - - -	South-west point - - -	22 34 38	73 38 8
Samaná or Atwood cay - - -	West point - - -	23 5 30	73 49 33
Crooked island - - -	Bird rock lighthouse - - -	22 51 0	74 22 0
Castle island - - -	Lighthouse - - -	22 6 40	74 20 40
Fortune island - - -	South end - - -	22 32 40	74 22 54
Watlings island - - -	Hinchinbroke rock - - -	23 56 40	74 28 34
Ram cay - - -	Harbour point - - -	23 37 45	74 50 8
Conception island - - -	West bay - - -	23 50 50	75 7 27
St. Domingo cay - - -	Centre - - -	21 42 0	75 45 9
Cay Verde - - -	Hill, south end - - -	22 1 15	75 10 34
Ragged island - - -	Gun point - - -	22 14 2	75 45 17
Nairn cay - - -	East point - - -	22 20 44	75 48 20
Nurse channel - - -	Channel cay beacon - - -	22 31 15	75 51 41
Long island - - -	South point - - -	22 51 0	74 51 54
" - - -	North point - - -	23 41 0	75 19 24
" Clarence harbour - - -	Site of Lochaber flag-staff - - -	23 5 45	74 59 0
Great Exuma island - - -	Beacon on Stocking island - - -	23 32 15	75 46 24
Wide opening - - -	Danger cay - - -	24 25 30	76 40 22
Wax cay cut - - -	Rock, south-west Bush hill - - -	24 34 25	76 47 24
Highborne cut - - -	Flag-staff - - -	24 42 45	76 48 49
Ship channel - - -	North point bluff cay - - -	24 51 52	76 48 5
Fleming channel - - -	Shannon beacon - - -	25 16 45	76 55 3
San Salvador (Cat island) - - -	Hawk's nest point - - -	24 9 15	75 33 4
" - - -	North-west point - - -	24 41 10	75 46 24
Eleuthera - - -	Cow and bull - - -	25 26 15	76 37 8
" - - -	Pigeon cay - - -	25 11 15	76 15 17
Royal island - - -	Eastern pap - - -	25 31 20	76 51 48
Douglas passage - - -	Douglas rocks - - -	25 8 40	77 5 45
Nassau - - -	Lighthouse - - -	25 5 37	77 22 22
" - - -	Ordnance wharf - - -	25 5 12	77 21 21
Green cay, tongue of ocean - - -	West point - - -	24 2 12	77 10 34
Andros island - - -	High cay - - -	24 39 30	77 42 30
" Morgan bluff - - -	North extreme - - -	25 10 40	78 1 36
Berry islands, Great Stirrup cay. - - -	Flag-staff (lighthouse) - - -	25 49 45	77 54 46
Great Isaac - - -	North-east end lighthouse - - -	26 2 0	79 5 49
Gun cay - - -	Lighthouse - - -	25 34 30	79 18 48
Cay Sal bank - - -	" - - -	23 56 30	80 27 48
" Anguila isles - - -	South-east extreme - - -	23 29 20	79 31 10
Cay Lobos - - -	Lighthouse - - -	22 22 50	77 35 9
Mucaras reef, Diamond point - - -	South extreme - - -	22 10 0	77 19 24
Ginger (Guinchos) cay - - -	Centre - - -	22 44 50	78 6 30
Abaco - - -	Lighthouse - - -	25 51 30	77 11 9
Bahama island - - -	West point - - -	26 41 18	79 0 38
Memory rock - - -	Centre - - -	26 56 53	79 6 54
N. W. Matanilla shoal - - -	Western edge - - -	27 21 30	79 3 54
Walkers cay - - -	Highest part - - -	27 15 42	78 23 48
Little Guano or Elbow cay - - -	Lighthouse - - -	26 31 10	76 58 0
Florida Cays and Strait.			
Tortugas - - -	Lighthouse, fort Jefferson - - -	24 37 46	82 52 53
Loggerhead cay - - -	Lighthouse - - -	24 38 5	82 55 46
Sand cay - - -	" - - -	24 27 10	81 52 43

Place.	Particular spot.	Latitude, North.	Longitude, West.
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Florida Cays and Strait—continued.

			° ' "	° ' "
Cay (Key), West U.S.	-	Naval storehouse (observing spot).	24 33 26	81 48 24
Do. do.	-	Lighthouse	24 32 58	81 48 4
Eastern Sambo cay	-	Beacon	24 29 32	81 39 50
American shoal	-	"	24 31 24	81 31 24
Coffin patches	-	Light on Sombrero shoal	24 37 36	81 6 43
Alligator reef	-	Lighthouse on north-east point of reef.	24 51 2	80 37 11
Crocker reef	-	Beacon	24 54 21	80 31 40
Conch reef	-	"	24 57 10	80 27 50
Pickles reef	-	"	24 59 22	80 24 55
French reef	-	"	25 2 6	80 21 5
Grecian shoal	-	"	25 7 22	80 18 0
Elbow shoal	-	"	25 8 32	80 15 40
Carysfort reef	-	Lighthouse	25 13 15	80 12 45
Turtle reef	-	Beacon	25 16 52	80 12 35
Pacific reef	-	"	25 22 10	80 8 30
Ajax reef	-	"	25 24 9	80 7 55
Long reef	-	"	25 26 45	80 7 23
Triumph reef	-	"	25 28 37	80 6 50
Fowey rocks	-	Lighthouse	25 35 23	80 5 52
Cape Florida	-	Tower of old lighthouse	25 39 56	80 9 24
Jupiter inlet	-	Lighthouse	26 55 26	80 5 5
Cape Canaveral	-	"	28 27 0	80 33 0

Bermuda.

Dockyard	-	Clock Tower	-	32 19 22	64 49 35
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